



Architectural Services Department

Programme No. 272RS

Kai Tak Multi-purpose Sports Complex

EIA Report

August 2016

(Appendices Vol. 2)

**The Joint Venture of
Cinotech Consultants Ltd
and Maurice Lee & Associates Ltd
in association with MVA Asia H.K. Limited**

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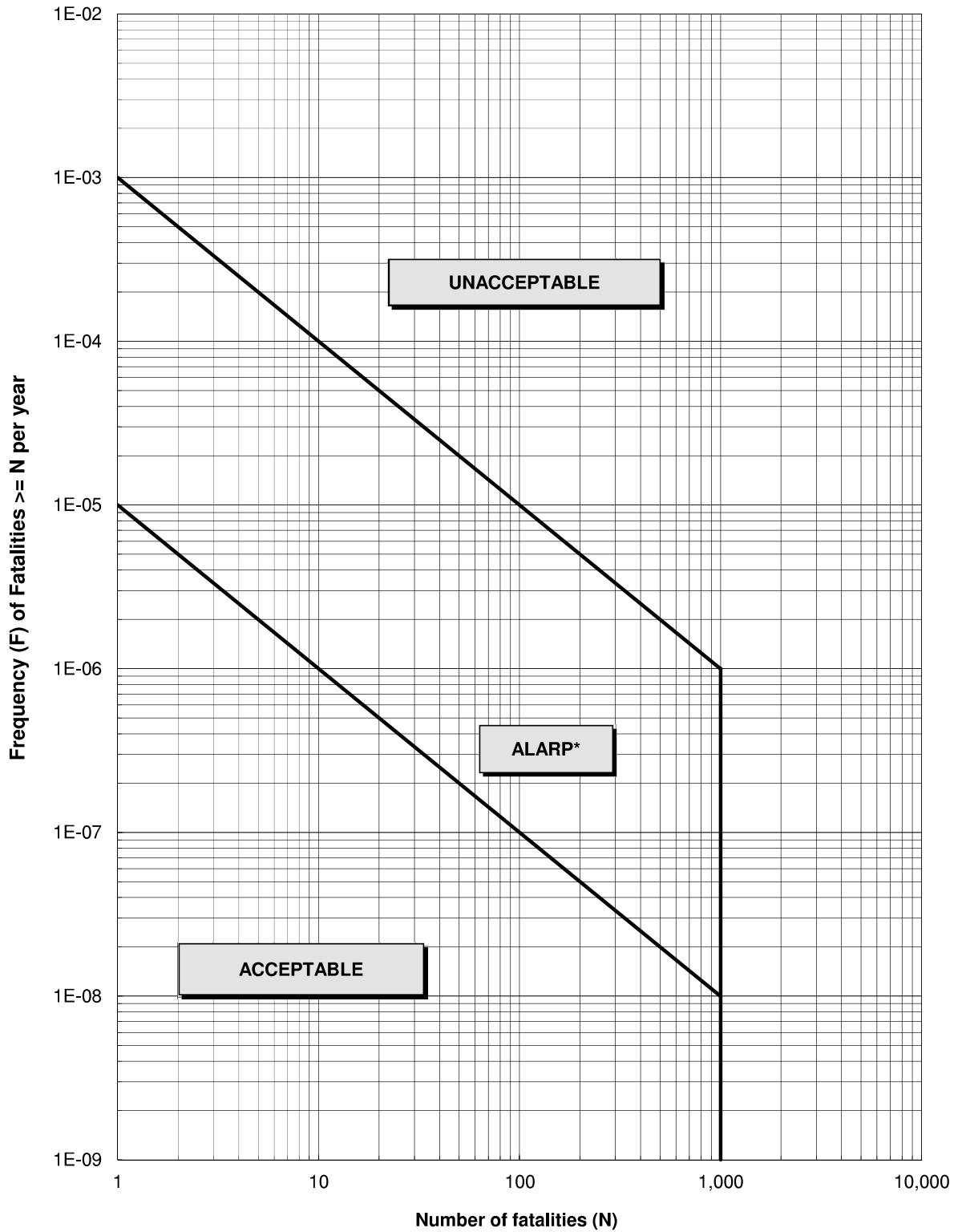
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Appendix 4.1

The Societal Risk Guidelines

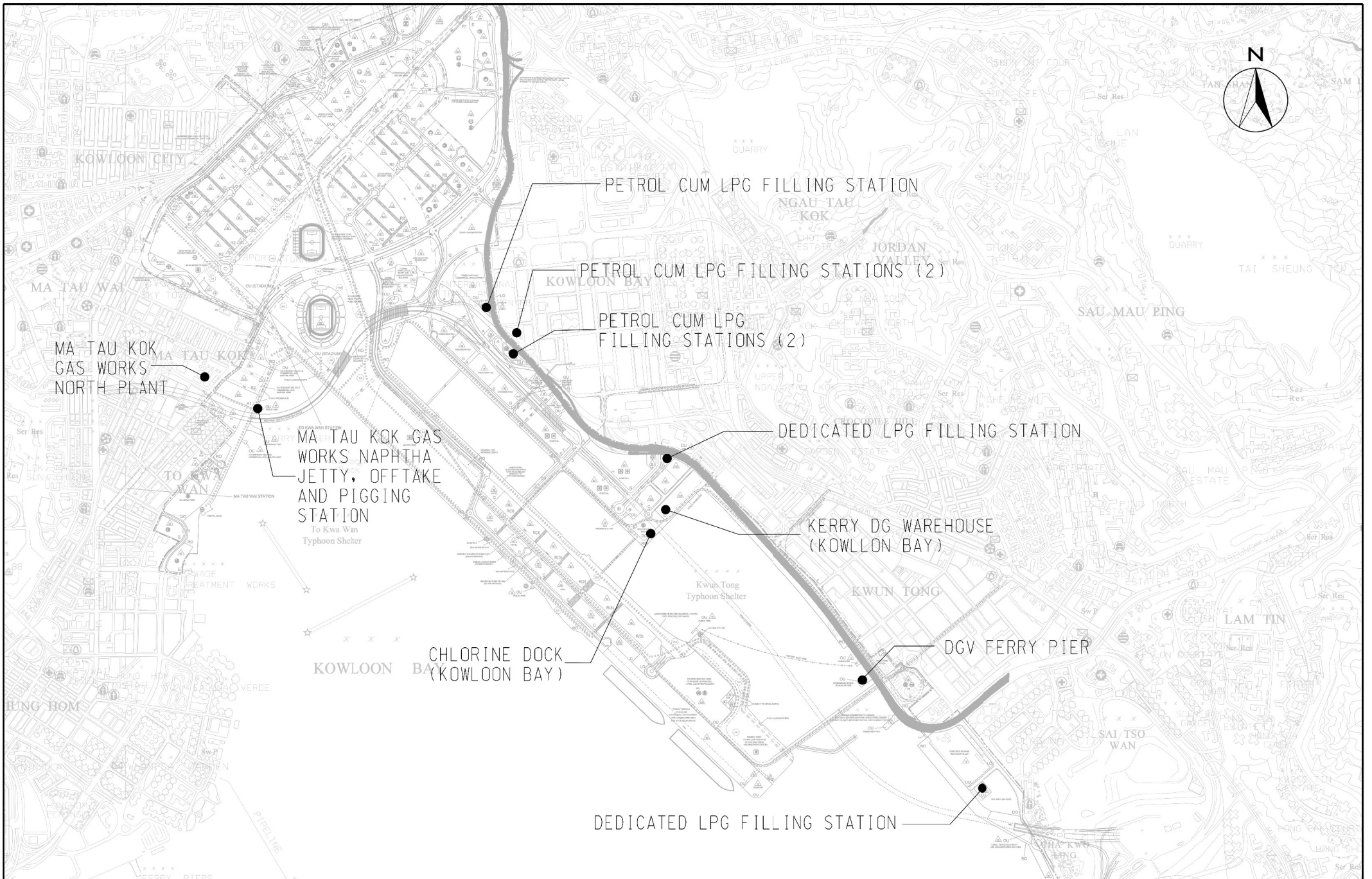
The Societal Risk Guideline



* Risk within this region should be reduced to as low as reasonably practicable

Appendix 4.2

The Locations of Hazardous Facilities



MAUNSELL | AECOM

Maunsell Consultants Asia Ltd

AGREEMENT NO. CE 35/2006 (CE)
 KAI TAK DEVELOPMENT ENGINEERING STUDY CUM DESIGN AND
 CONSTRUCTION OF ADVANCE WORKS- INVESTIGATION, DESIGN AND CONSTRUCTION

LOCATIONS OF IDENTIFIED HAZARDOUS FACILITIES

SCALE	A3 1:15000	DATE	MAY 2008
CHECK	TCYC	DRAWN	ALFA
JOB No.	60022503	DRAWING No.	11.1.1 -

Appendix 5.1A

Prevailing Background Noise Levels

- A.1 Details of prevailing background noise measurement at selected representative locations are provided in **Table 1**. The measurement results of the prevailing noise levels are listed in **Table 2**.

Table 1 *Details of Background Noise Measurement*

	Sung Wong Toi Road, Ma Tau Kok [a]	Junction of Sung Wong Toi Road and To Kwa Wan Road [b]	Bridges Street, Sheung Wan [c]
Height (mAG)	5.5	5.5	5.5
Distance from nearest vertical reflective surface (m)	>20	3	2

[a]: Measurement location 1 on Figure 5-2.

[b]: Measurement location 2 on Figure 5-2.

[c]: Measurement location on Figure 5-3.

Table 2 *Measurement Results for Prevailing Noise Levels*

Time	Leq (30 mins), dB(A)		
	Sung Wong Toi Road, Ma Tau Kok (9-4-2015)	Junction of Sung Wong Toi Road and To Kwa Wan Road (29-9-2015)	Bridges Street, Sheung Wan (6-3-2015)
2030-2100	68.1	66.7	66.0
2100-2130	68.7	65.1	64.9
2130-2200	67.6	66.3	63.1
2200-2230	66.7	65.4	67.5
2230-2300	67.0	65.4	65.2
2300-2330	65.3	63.4	63.1
2330-0000	64.7	63.9	60.3
0000-0030	63.8	63.3	60.5
0030-0100	-	-	59.3

- A.2 For conservative approach, the lowest measured noise levels (rounded to nearest integer) in the respective time period (day/evening time or night time) are taken as the prevailing background noise when assessing the noise impact from open air entertainment activities.

Appendix 5.1B

**Photographic Records for the Noise
Sensitive Receivers**



CN1

CN1: 1 Hing Yan Streets



CN2

CN2: Ma Tau Kok 13 Streets



CN3

CN3: HK society for Blind Hostel



CN4

CN4: Ma Tau Kok 13 Streets



CN5

CN5: Sky Tower



N1

N1: Ma Tau Kok 13 Streets



N2

N2: Sky Tower



TN1: Sir Robert Black Health Centre



TN2: Lee Kau Yan Memorial School



TN3: South Masion



TN4: Jenford Building



TN5: Holy Trinity Church



TN6: Parc 22



TN7: Sky Tower



TN8: HK Society for Blind Hostel



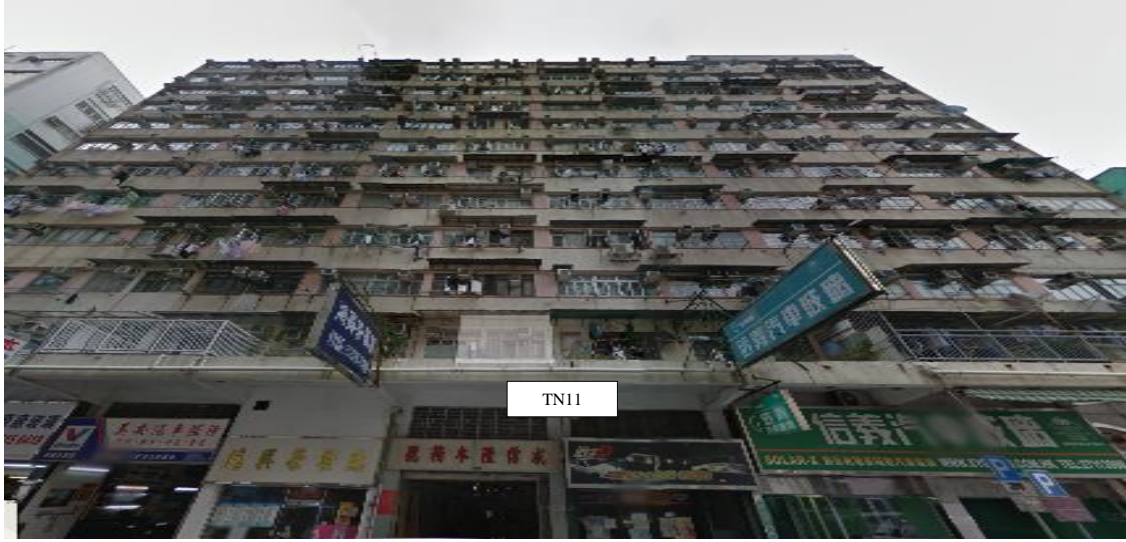
TN9: Ma Tou Kok 13 Streets



TN10: Grand Waterfront



TN12: Kowloon City Road No. 183



TN11: Kam Tong Building



TN13: Ma Tou Kok 13 Streets



TN14

TN14: Ma Tou Kok 13 Streets



TN15

TN15: Po Sing Mansion



TN16

TN16: The Latitude



TN17: Trade and Industry Tower with Community Hall

Appendix 5.2A

Construction Plant Inventory (Unmitigated)

Activity	PME	TM	SWL	No.	% on time	Barrier Correction	Sub-SWL	Total SWL	
A1	Site Preparation	Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	0	103	122
		Breaker, excavator mounted (pneumatic)	CNP 027	122	2	30%	0	120	
		Dump Truck	CNP 067	117	2	50%	0	117	
		Poker, vibratory, hand-held (electric)	Others*	102	1	20%	0	95	
		Concrete lorry mixer	CNP 044	109	2	30%	0	107	
		Water pump (electric)	CNP 281	88	2	100%	0	91	
		Excavator/ loader, wheeled/ tracked	CNP 081	112	2	30%	0	110	
	Backhoe	CNP 081	109	2	50%	0	109		
A2	Pilling	Crane, mobile (diesel)	CNP 048	112	2	50%	0	112	121
		Piling, large diameter bored, reverse circulation drill	CNP 166	100	2	50%	0	100	
		Piling, large diameter bored, oscillator	CNP 165	115	2	50%	0	115	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	0	103	
		Air compressor, air flow > 30m3/min	CNP 003	104	2	100%	0	107	
		Concrete lorry mixer	CNP 044	109	1	50%	0	106	
		Dump Truck	CNP 067	117	2	50%	0	117	
	Excavator/ loader, wheeled/ tracked	CNP 081	112	2	30%	0	110		
A3	Pile Cap Construction	Crane, mobile (diesel)	CNP 048	112	2	50%	0	112	120
		Concrete pump, stationary/ lorry mounted	CNP 047	109	1	50%	0	106	
		Poker, vibratory, hand-held (electric)	Others*	102	1	20%	0	95	
		Bar bender and cutter (electric)	CNP 021	90	1	20%	0	83	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	0	103	
		Air compressor, air flow > 30m3/min	CNP 003	104	2	100%	0	107	
		Concrete lorry mixer	CNP 044	109	1	50%	0	106	
		Saw, circular, wood	CNP 201	108	2	30%	0	106	
		Dump Truck	CNP 067	117	2	50%	0	117	
		Water pump (electric)	CNP 281	88	2	100%	0	91	
	Excavator/ loader, wheeled/ tracked	CNP 081	112	2	30%	0	110		
	Breaker, excavator mounted (pneumatic)	CNP 027	122	1	10%	0	112		
A4	Back-filling & Basement Structures	Crane, mobile (diesel)	CNP 048	112	1	50%	0	109	120
		Concrete pump, stationary/ lorry mounted	CNP 047	109	1	20%	0	102	
		Poker, vibratory, hand-held (electric)	Others*	102	1	20%	0	95	
		Bar bender and cutter (electric)	CNP 021	90	1	20%	0	83	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	0	103	
		Concrete lorry mixer	CNP 044	109	1	20%	0	102	
		Power rammer (petrol)	CNP169	108	2	80%	0	110	
		Compactor, vibratory	CNP 050	105	2	80%	0	107	
		Roller, vibratory	CNP 185	108	1	80%	0	107	
		Water pump (electric)	CNP 281	88	2	30%	0	86	
		Dump Truck	CNP 067	117	2	50%	0	117	
			Excavator/ loader, wheeled/ tracked	CNP 081	112	2	30%	0	
A5	Superstructure	Crane, tower (electric)	CNP 049	95	2	80%	0	97	118
		Crane, mobile (diesel)	CNP 048	112	2	80%	0	114	
		Crane Lorry, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	1	50%	0	102	
		Concrete pump, stationary/ lorry mounted	CNP 047	109	1	50%	0	106	
		Poker, vibratory, hand-held (electric)	Others*	102	3	50%	0	104	
		Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87	
		Saw, circular, wood	CNP 201	108	2	30%	0	106	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	0	103	
		Air compressor, air flow > 30m3/min	CNP 003	104	1	100%	0	104	
		Concrete lorry mixer	CNP 044	109	2	50%	0	109	
		Drill/grinder, hand-held (electric)	CNP 065	98	5	30%	0	100	
		Water pump (electric)	CNP 281	88	2	30%	0	86	
		Excavator/ loader, wheeled/ tracked	CNP 081	112	2	30%	0	110	
Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93			
A5a	Steel Frame and Retractable Roof of Main Stadium	Crane, tower (electric)	CNP 049	95	2	80%	0	97	117
		Crane, mobile (diesel)	CNP 048	112	3	80%	0	116	
		Crane Lorry, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	1	50%	0	102	
		Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87	
		Saw, circular, wood	CNP 201	108	2	30%	0	106	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	0	103	
		Air compressor, air flow > 30m3/min	CNP 003	104	1	100%	0	104	
		Drill/grinder, hand-held (electric)	CNP 065	98	7	30%	0	101	
	Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93		

Appendix 5.2A - Construction Plant Inventory (Unmitigated)

Activity	PME	TM	SWL	No.	% on time	Barrier Correction	Sub-SWL	Total SWL	
A5b	Steel Roof Frame of Indoor Sports Centre	Crane, tower (electric)	CNP 049	95	2	80%	0	97	117
		Crane, mobile (diesel)	CNP 048	112	3	80%	0	116	
		Crane Lorry, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	1	50%	0	102	
		Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87	
		Saw, circular, wood	CNP 201	108	2	30%	0	106	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	0	103	
		Air compressor, air flow > 30m3/min	CNP 003	104	1	100%	0	104	
		Drill/grinder, hand-held (electric)	CNP 065	98	7	30%	0	101	
A6	Builder's Work	Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93	104
		Drill/grinder, hand-held (electric)	CNP 065	98	7	50%	0	103	
		Welder/Generator, portable	CNP 107***	90	2	50%	0	90	
		Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93	
		Lifting Platform (electric)	CNP 122	95	2	50%	0	95	
A7a	External Works	Drill/grinder, hand-held (electric)	CNP 065	98	3	50%	0	100	102
		Welder/Generator, portable	CNP 107***	90	2	50%	0	90	
		Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93	
		Lifting Platform (electric)	CNP 122	95	2	50%	0	95	
A7b	Landscaping Works	Drill/grinder, hand-held (electric)	CNP 065	98	5	50%	0	102	103
		Welder/Generator, portable	CNP 107***	90	2	50%	0	90	
		Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93	

Remark:

* Others - EPD website: http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf

***Reference to EIA report of AEIAR-171/2013 - Central Kowloon Route, Appendix 5.4A

Appendix 5.2B

Programme of Construction Activities

Appendix 5.2B - Programme of Construction Activities

Zone	Activities																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	A1	A1	A2	A2	A2	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A3	A5	A5	A5	A5	A5	A5	A5	A5
N2	A1	A1	A2	A2	A2	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A3	A5	A5	A5	A5	A5	A5	A5	A5
N3		A1	A1	A1																				
N4																								A5
N5	A1	A1	A1	A2	A2	A2	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A3	A5	A5	A5	A5	A5	A5	A5
N6	A1	A1	A1	A2	A2	A2	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A3	A5	A5	A5	A5	A5	A5	A5
N7	A1	A1																						
N8	A1	A1																						
South Portion																								
S1	A1	A1	A1	A2	A2	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A4	A4	A4	A4	A5	A5	A5	A5	A5
S2	A1	A1	A1									A2	A3											A5
S3	A1	A1	A1									A2	A3											A5
S4	A1	A1	A1										A2	A3										A5
S5	A1	A1	A1	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A4	A4	A5	A5	A5	A5	A5	A5	A5	A5	A5a
S6	A1	A1	A1	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A4	A4	A5	A5	A5	A5	A5	A5	A5	A5	A5a
S7	A1	A1	A1	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A4	A4	A5	A5	A5	A5	A5	A5	A5	A5	A5a
S8	A1	A1	A1	A2	A2	A2	A2	A2	A2	A3	A3	A3	A3	A4	A4	A5	A5	A5	A5	A5	A5	A5	A5	A5a
S9	A1	A1	A1									A2	A3											A5
S10	A1	A1	A1									A2	A3											A5
S11	A1	A1	A1									A2	A3											A5
S12	A1	A1	A1										A2	A3										A5

*Activities

- A1 Site Preparation
- A2 Pilling
- A3 Pile Cap Construction
- A4 Back-filling & Basement Structures
- A5 Superstructure
- A5a Steel Frame and Retractable Roof of Main Stadium
- A5b Steel Roof Frame of Indoor Sports Centre
- A6 Builder's Work
- A7a External Works
- A7b Landscaping Works

Appendix 5.2B - Programme of Construction Activities

Zone	Activities																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7b	A7b	A7b
N2	A5	A5	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7b
N3																A7a	A7a	A7a	A7a	A7b	A7b			
N4	A5	A5	A5	A5														A7a	A7a					
N5	A5	A5	A5	A5	A5b	A5b	A5b	A5b	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7a
N6	A5	A5	A5	A5	A5b	A5b	A5b	A5b	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7a
N7													A7a	A7a	A7a	A7b	A7b	A7b	A7b	A7b	A7b	A7b	A7b	A7b
N8													A7a	A7a	A7a	A7b	A7b	A7b	A7b	A7b	A7b	A7b	A7b	A7b
South Portion																								
S1	A5	A5	A5	A5	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7a
S2	A5	A5	A5	A5													A7a	A7a	A7a					
S3	A5	A5	A5	A5													A7a	A7a	A7a					
S4	A5	A5	A5	A5													A7a	A7a	A7a					
S5	A5a	A5a	A5a	A5a	A5a	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7a
S6	A5a	A5a	A5a	A5a	A5a	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7a
S7	A5a	A5a	A5a	A5a	A5a	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7a
S8	A5a	A5a	A5a	A5a	A5a	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A6	A7a	A7a	A7a
S9	A5	A5	A5	A5															A7a	A7a	A7a			
S10	A5	A5	A5	A5														A7a	A7a	A7a	A7b	A7b	A7b	A7b
S11	A5	A5	A5	A5														A7a	A7a	A7a	A7b	A7b	A7b	A7b
S12	A5	A5	A5	A5															A7a	A7a	A7a			

*Activities

- A1 Site Preparation
- A2 Piling
- A3 Pile Cap Construction
- A4 Back-filling & Basement Structures
- A5 Superstructure
- A5a Steel Frame and Retractable Roof of Main Stadium
- A5b Steel Roof Frame of Indoor Sports Centre
- A6 Builder's Work
- A7a External Works
- A7b Landscaping Works

Appendix 5.2C

**SWL of Construction Activities
(Unmitigated)**

Appendix 5.2C - SWL of Construction Activities (Unmitigated)

Zone	SWL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	122	122	121	121	121	121	121	121	121	121	121	120	120	120	120	120	118	118	118	118	118	118	118	118
N2	122	122	121	121	121	121	121	121	121	121	121	120	120	120	120	120	118	118	118	118	118	118	118	118
N3		122	122	122																				
N4																								118
N5	122	122	122	121	121	121	121	121	121	121	121	121	120	120	120	120	120	118	118	118	118	118	118	118
N6	122	122	122	121	121	121	121	121	121	121	121	121	120	120	120	120	120	118	118	118	118	118	118	118
N7	122	122																						
N8	122	122																						
South Portion																								
S1	122	122	122	121	121	121	121	121	121	121	121	120	120	120	120	120	120	120	120	118	118	118	118	118
S2	122	122	122								121	120												118
S3	122	122	122									121	120											118
S4	122	122	122										121	120										118
S5	122	122	122	121	121	121	121	121	121	120	120	120	120	120	120	118	118	118	118	118	118	118	118	117
S6	122	122	122	121	121	121	121	121	121	120	120	120	120	120	120	118	118	118	118	118	118	118	118	117
S7	122	122	122	121	121	121	121	121	121	120	120	120	120	120	120	118	118	118	118	118	118	118	118	117
S8	122	122	122	121	121	121	121	121	121	120	120	120	120	120	120	118	118	118	118	118	118	118	118	117
S9	122	122	122								121	120												118
S10	122	122	122								121	120												118
S11	122	122	122									121	120											118
S12	122	122	122										121	120										118

Appendix 5.2C - SWL of Construction Activities (Unmitigated)

Zone	SWL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	103	103	103
N2	118	118	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	103
N3															102	102	102	102	103	103				
N4	118	118	118	118														102	102					
N5	118	118	118	118	117	117	117	117	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
N6	118	118	118	118	117	117	117	117	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
N7													102	102	102	103	103	103	103	103	103	103	103	103
N8													102	102	102	103	103	103	103	103	103	103	103	103
South Portion																								
S1	118	118	118	118	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S2	118	118	118	118												102	102	102						
S3	118	118	118	118												102	102	102						
S4	118	118	118	118												102	102	102						
S5	117	117	117	117	117	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S6	117	117	117	117	117	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S7	117	117	117	117	117	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S8	117	117	117	117	117	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S9	118	118	118	118															102	102	102			
S10	118	118	118	118													102	102	102	103	103	103	103	103
S11	118	118	118	118													102	102	102	103	103	103	103	103
S12	118	118	118	118															102	102	102			

Appendix 5.2D

**Notional Distance, Correction and
Screening of NSRs**

Table 1 - Notional Distance from Construction Zones to NSRs, m

Zone	NSR												
	CN1	CN2	CN3	CN4	CN5	CN6	CN7	CN8	CN9	CN10	CN11	CN12	CN13
N1	444	264	237	263	261	708	167	219	96	136	330	450	540
N2	462	287	257	372	408	648	215	324	200	166	324	378	438
N3	600	444	402	480	480	564	336	414	240	119	192	312	408
N4	498	378	342	474	534	582	288	438	324	287	360	354	318
N5	726	576	540	594	588	384	480	528	318	189	95	133	312
N6	624	498	462	558	582	444	396	492	318	222	224	200	254
N7	792	678	636	732	714	295	570	648	450	318	160	68	215
N8	678	594	552	690	720	378	504	636	480	384	284	193	117
S1	290	196	154	330	444	750	119	336	324	366	504	516	492
S2	372	281	237	420	522	684	209	426	372	366	462	456	390
S3	252	227	200	426	552	858	213	450	444	474	612	618	528
S4	510	420	384	540	618	612	336	522	426	378	426	384	268
S5	396	324	274	468	582	702	262	480	432	426	504	486	366
S6	288	284	265	468	594	810	264	498	474	498	606	582	450
S7	438	390	384	564	672	678	354	570	504	486	516	474	318
S8	360	390	372	564	690	786	360	588	558	552	624	582	420
S9	272	348	297	540	678	912	342	582	594	624	738	702	546
S10	552	522	492	654	744	552	450	654	540	528	462	378	174
S11	528	516	486	666	774	666	456	672	600	564	576	498	270
S12	414	456	438	636	768	792	432	666	636	642	696	636	402

Table 2 - Distance Attenuation and Façade Correction, dB(A)

Zone	NSR												
	CN1	CN2	CN3	CN4	CN5	CN6	CN7	CN8	CN9	CN10	CN11	CN12	CN13
N1	-58	-53	-52	-53	-53	-62	-49	-52	-45	-48	-55	-58	-60
N2	-58	-54	-53	-56	-57	-61	-52	-55	-51	-49	-55	-57	-58
N3	-61	-58	-57	-59	-59	-60	-56	-57	-53	-46	-51	-55	-57
N4	-59	-57	-56	-58	-60	-60	-54	-58	-55	-54	-56	-56	-55
N5	-62	-60	-60	-60	-60	-57	-59	-59	-55	-51	-45	-47	-55
N6	-61	-59	-58	-60	-60	-58	-57	-59	-55	-52	-52	-51	-53
N7	-63	-62	-61	-62	-62	-54	-60	-61	-58	-55	-49	-42	-52
N8	-62	-60	-60	-62	-62	-57	-59	-61	-59	-57	-54	-51	-46
S1	-54	-51	-49	-55	-58	-62	-46	-56	-55	-56	-59	-59	-59
S2	-56	-54	-52	-57	-59	-62	-51	-58	-56	-56	-58	-58	-57
S3	-53	-52	-51	-58	-60	-64	-52	-58	-58	-58	-61	-61	-59
S4	-59	-57	-57	-60	-61	-61	-56	-59	-58	-57	-58	-57	-54
S5	-57	-55	-54	-58	-60	-62	-53	-59	-58	-58	-59	-59	-56
S6	-54	-54	-53	-58	-60	-63	-53	-59	-58	-59	-61	-60	-58
S7	-58	-57	-57	-60	-62	-62	-56	-60	-59	-59	-59	-58	-55
S8	-56	-57	-56	-60	-62	-63	-56	-60	-60	-60	-61	-60	-57
S9	-54	-56	-54	-60	-62	-64	-56	-60	-60	-61	-62	-62	-60
S10	-60	-59	-59	-61	-62	-60	-58	-61	-60	-59	-58	-57	-50
S11	-59	-59	-59	-61	-63	-61	-58	-62	-61	-60	-60	-59	-54
S12	-57	-58	-58	-61	-63	-63	-58	-61	-61	-61	-62	-61	-57

Table 3 - Screening Between Construction Zones and NSRs, dB(A)

Zone	NSR												
	CN1	CN2	CN3	CN4	CN5	CN6	CN7	CN8	CN9	CN10	CN11	CN12	CN13
N1	0	0	0	0	0	0	0	0	0	0	0	0	0
N2	0	0	0	0	0	0	0	0	0	0	0	0	0
N3	0	0	0	0	0	0	0	0	0	0	0	0	0
N4	0	0	0	0	0	0	0	0	0	0	0	0	0
N5	0	0	0	0	0	0	0	0	0	0	0	0	0
N6	0	0	0	0	0	0	0	0	0	0	0	0	0
N7	0	0	0	0	0	0	0	0	0	0	0	0	0
N8	0	0	0	0	0	0	0	0	0	0	0	0	0
S1	0	0	0	0	0	0	0	0	0	0	0	0	0
S2	0	0	0	0	0	0	0	0	0	0	0	0	0
S3	0	0	0	0	0	0	0	0	0	0	0	0	0
S4	0	0	0	0	0	0	0	0	0	0	0	0	0
S5	0	0	0	0	0	0	0	0	0	0	0	0	0
S6	0	0	0	0	0	0	0	0	0	0	0	0	0
S7	0	0	0	0	0	0	0	0	0	0	0	0	0
S8	0	0	0	0	0	0	0	0	0	0	0	0	0
S9	0	0	0	0	0	0	0	0	0	0	0	0	0
S10	0	0	0	0	0	0	0	0	0	0	0	0	0
S11	0	0	0	0	0	0	0	0	0	0	0	0	0
S12	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 5.2E

**Construction Noise Calculation
(Unmitigated)**

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN1 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	64	64	63	63	63	63	63	63	63	63	63	63	63	63	63	63	60	60	60	60	60	60	60	60
N2	64	64	62	62	62	62	62	62	62	62	62	62	62	62	62	62	60	60	60	60	60	60	60	60
N3		62	62	62																				
N4																								59
N5	60	60	60	59	59	59	59	59	59	59	59	59	58	58	58	58	58	56	56	56	56	56	56	56
N6	61	61	61	60	60	60	60	60	60	60	60	60	60	60	60	60	57	57	57	57	57	57	57	57
N7	59	59																						
N8	61	61																						
South Portion																								
S1	68	68	68	67	67	67	67	67	67	67	67	66	66	66	66	65	65	65	65	64	64	64	64	64
S2	66	66	66							64	64													61
S3	69	69	69								68	67												65
S4	63	63	63									62	61											59
S5	65	65	65	64	64	64	64	64	64	63	63	63	63	63	63	61	61	61	61	61	61	61	61	60
S6	68	68	68	67	67	67	67	67	67	66	66	66	66	66	66	64	64	64	64	64	64	64	64	63
S7	64	64	64	63	63	63	63	63	63	63	63	63	63	62	62	60	60	60	60	60	60	60	60	59
S8	66	66	66	65	65	65	65	65	65	64	64	64	64	64	64	62	62	62	62	62	62	62	62	61
S9	69	69	69							67	67													64
S10	62	62	62							61	61													58
S11	63	63	63								61	61												58
S12	65	65	65									63	63											61
Total SPL, dB(A)	78	78	78	74	73	73	73	73	73	74	75	75	75	74	74	73	72	71	71	70	70	70	71	73
Exceedance	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN1 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	45	45	45
N2	60	60	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
N3															41	41	41	41	42	42				
N4	59	59	59	59														43	43					
N5	56	56	56	56	55	55	55	55	42	42	42	42	42	42	42	42	42	42	42	42	42	40	40	40
N6	57	57	57	57	56	56	56	56	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
			44	44	44	44	44	44																
N7												39	39	39	40	40	40	40	40	40	40	40	40	40
N8												40	40	40	41	41	41	41	41	41	41	41	41	41
South Portion																								
S1	64	64	64	64	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	48	48	48
		50	50	50																				
S2	61	61	61	61													46	46	46					
S3	65	65	65	65													49	49	49					
S4	59	59	59	59													43	43	43					
S5	60	60	60	60	60	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
	48	48	48	48	48																			
S6	63	63	63	63	63	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	48	48	48
	50	50	50	50	50																			
S7	59	59	59	59	59	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
	47	47	47	47	47																			
S8	61	61	61	61	61	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
	48	48	48	48	48																			
S9	64	64	64	64																48	48	48		
S10	58	58	58	58													42	42	42	43	43	43	43	43
S11	58	58	58	58													42	42	42	43	43	43	43	43
S12	61	61	61	61																45	45	45		
Total SPL, dB(A)	73	73	73	73	68	61	61	61	57	57	57	57	57	57	57	59	59	59	59	58	58	55	55	56
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN2 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	69	69	67	67	67	67	67	67	67	67	67	67	67	67	67	67	64	64	64	64	64	64	64	64
N2	68	68	67	67	67	67	67	67	67	67	67	66	66	66	66	66	64	64	64	64	64	64	64	64
N3		64	64	64																				
N4																								61
N5	62	62	62	61	61	61	61	61	61	61	61	61	60	60	60	60	60	58	58	58	58	58	58	58
N6	63	63	63	62	62	62	62	62	62	62	62	62	62	62	62	62	62	59	59	59	59	59	59	59
N7	61	61																						
N8	62	62																						
South Portion																								
S1	71	71	71	70	70	70	70	70	70	70	70	70	70	70	70	69	69	69	69	67	67	67	67	67
S2	68	68	68									67	66											64
S3	70	70	70									69	68											66
S4	65	65	65										63	63										60
S5	67	67	67	66	66	66	66	66	66	65	65	65	65	65	65	63	63	63	63	63	63	63	63	62
S6	68	68	68	67	67	67	67	67	67	66	66	66	66	66	66	64	64	64	64	64	64	64	64	63
S7	65	65	65	64	64	64	64	64	64	64	64	64	64	63	63	61	61	61	61	61	61	61	61	60
S8	65	65	65	64	64	64	64	64	64	64	64	64	64	63	63	61	61	61	61	61	61	61	61	60
S9	66	66	66																					62
S10	63	63	63									61	61											59
S11	63	63	63									62	61											59
S12	64	64	64										63	62										60
Total SPL, dB(A)	79	79	79	76	76	76	76	76	76	76	76	77	77	77	76	76	74	73	73	73	73	73	73	75
Exceedance	4	4	4	1	1	1	1	1	1	1	1	2	2	2	1	1	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN2 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	49	49	49
N2	64	64	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	48	48	49
N3															44	44	44	44	45	45				
N4	61	61	61	61														45	45					
N5	58	58	58	58	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
N6	59	59	59	59	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
N7													40	40	40	41	41	41	41	41	41	41	41	41
N8													41	41	41	42	42	42	42	42	42	42	42	42
South Portion																								
S1	67	67	67	67	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	51	51	51
S2		54	54	54																				
S3	64	64	64	64												48	48	48						
S4	66	66	66	66												50	50	50						
S5	60	60	60	60												44	44	44						
S5	62	62	62	62	62	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
S6	49	49	49	49	49																			
S6	63	63	63	63	63	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	48	48	48
S7	50	50	50	50	50																			
S7	60	60	60	60	60	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
S8	48	48	48	48	48																			
S8	60	60	60	60	60	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
S9	48	48	48	48	48																			
S9	62	62	62	62																	46	46	46	
S10	59	59	59	59																	43	43	43	43
S11	59	59	59	59																	43	43	43	43
S12	59	59	59	59																	43	43	43	43
S12	60	60	60	60																	44	44	44	
Total SPL, dB(A)	74	74	74	74	69	63	63	63	59	59	59	59	59	59	60	61	61	61	60	60	60	57	57	58
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN3 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	70	70	68	68	68	68	68	68	68	68	68	68	68	68	68	68	65	65	65	65	65	65	65	65
N2	69	69	68	68	68	68	68	68	68	68	68	67	67	67	67	67	65	65	65	65	65	65	65	65
N3		65	65	65																				
N4																								62
N5	63	63	63	61	61	61	61	61	61	61	61	61	61	61	61	61	61	58	58	58	58	58	58	58
N6	64	64	64	62	62	62	62	62	62	62	62	62	62	62	62	62	60	60	60	60	60	60	60	60
N7	61	61																						
N8	62	62																						
South Portion																								
S1	74	74	74	72	72	72	72	72	72	72	72	72	72	72	72	71	71	71	71	69	69	69	69	69
S2	70	70	70							68	68													65
S3	71	71	71								70		69											67
S4	66	66	66										64	64										61
S5	69	69	69	67	67	67	67	67	67	67	67	67	67	66	66	64	64	64	64	64	64	64	64	63
S6	69	69	69	67	67	67	67	67	67	67	67	67	67	66	66	64	64	64	64	64	64	64	64	51
S7	66	66	66	64	64	64	64	64	64	64	64	64	64	63	63	61	61	61	61	61	61	61	61	48
S8	66	66	66	64	64	64	64	64	64	64	64	64	64	63	63	61	61	61	61	61	61	61	61	48
S9	68	68	68							66	66													63
S10	63	63	63							62	62													59
S11	64	64	64								62		62											59
S12	64	64	64										63	63										60
Total SPL, dB(A)	80	81	80	77	77	77	77	77	77	77	78	78	78	78	77	77	75	75	75	74	74	74	74	76
Exceedance	5	6	5	2	2	2	2	2	2	2	3	3	3	3	2	2	-	-	-	-	-	-	-	1

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN3 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	49	49	50	50	50
N2	65	65	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	50
N3															45	45	45	45	46	46				
N4	62	62	62	62														46	46					
N5	58	58	58	58	57	57	57	57	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
N6	60	60	60	60	59	59	59	59	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
N7															41	41	41	42	42	42	42	42	42	42
N8															42	42	42	43	43	43	43	43	43	43
South Portion																								
S1	69	69	69	69	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	53	53	53
S2		56	56	56																				
S3	65	65	65	65													49	49	49					
S4	67	67	67	67													51	51	51					
S5	61	61	61	61													45	45	45					
S5	63	63	63	63	63	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	48
S6	51	51	51	51	51																			
S6	64	64	64	64	64	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	48
S7	51	51	51	51	51																			
S7	60	60	60	60	60	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
S8	48	48	48	48	48																			
S8	61	61	61	61	61	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S9	48	48	48	48	48																			
S9	63	63	63	63																	47	47	47	
S10	59	59	59	59													43	43	43	44	44	44	44	44
S11	59	59	59	59													43	43	43	44	44	44	44	44
S12	60	60	60	60																44	44	44		
Total SPL, dB(A)	76	76	75	75	70	64	64	64	60	60	61	61	61	61	61	62	62	62	61	61	61	59	59	59
Exceedance	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN4 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	69	69	67	67	67	67	67	67	67	67	67	67	67	67	67	67	64	64	64	64	64	64	64	64
N2	66	66	64	64	64	64	64	64	64	64	64	64	64	64	64	64	61	61	61	61	61	61	61	61
N3		64	64	64																				
N4																								59
N5	62	62	62	60	60	60	60	60	60	60	60	60	60	60	60	60	60	57	57	57	57	57	57	57
N6	62	62	62	61	61	61	61	61	61	61	61	61	61	61	61	61	60	60	60	60	60	60	60	60
N7	60	60																						
N8	61	61																						
South Portion																								
S1	67	67	67	65	65	65	65	65	65	65	65	65	65	65	65	64	64	64	64	62	62	62	62	62
S2	65	65	65								63	63												60
S3	65	65	65								63	63												60
S4	63	63	63										61	61										58
S5	64	64	64	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	59
S6	64	64	64	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	59
S7	62	62	62	61	61	61	61	61	61	60	60	60	60	60	60	58	58	58	58	58	58	58	58	57
S8	62	62	62	61	61	61	61	61	61	60	60	60	60	60	60	58	58	58	58	58	58	58	58	57
S9	63	63	63							61	61													58
S10	61	61	61							59	59													57
S11	61	61	61								59	59												56
S12	61	61	61									60	59											57
Total SPL, dB(A)	76	77	76	73	73	73	73	73	73	73	74	74	75	74	74	74	71	70	70	70	70	70	70	72
Exceedance	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN4 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49	49	49
N2	61	61	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
N3															43	43	43	43	44	44				
N4	59	59	59	59														43	43					
N5	57	57	57	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
N6	58	58	58	58	57	57	57	57	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
N7													40	40	40	40	40	40	40	40	40	40	40	40
N8													40	40	40	41	41	41	41	41	41	41	41	41
South Portion																								
S1	62	62	62	62	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
S2		49	49	49																				
S3	60	60	60	60													44	44	44					
S4	58	58	58	58													42	42	42					
S5	59	59	59	59	59	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
S6	59	59	59	59	59	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
S7	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S8	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S9	58	58	58	58																				
S10	57	57	57	57															42	42	42			
S11	56	56	56	56															41	41	41	41	41	41
S12	57	57	57	57															41	41	41			
Total SPL, dB(A)	71	71	71	71	66	62	62	62	57	57	57	57	57	57	57	58	58	58	58	57	57	55	55	55
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN5 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	69	69	67	67	67	67	67	67	67	67	67	67	67	67	67	67	65	65	65	65	65	65	65	65
N2	65	65	64	64	64	64	64	64	64	64	64	63	63	63	63	63	61	61	61	61	61	61	61	61
N3		64	64	64																				
N4																								58
N5	62	62	62	60	60	60	60	60	60	60	60	60	60	60	60	60	60	57	57	57	57	57	57	57
N6	62	62	62	60	60	60	60	60	60	60	60	60	60	60	60	60	58	58	58	58	58	58	58	58
N7	60	60																						
N8	60	60																						
South Portion																								
S1	64	64	64	63	63	63	63	63	63	63	63	63	63	63	63	62	62	62	62	60	60	60	60	60
S2	63	63	63								61	61												59
S3	62	62	62								61	61												58
S4	61	61	61										60	60										57
S5	62	62	62	60	60	60	60	60	60	60	60	60	60	59	59	58	58	58	58	58	58	58	58	57
S6	62	62	62	60	60	60	60	60	60	60	60	60	60	59	59	57	57	57	57	57	57	57	57	57
S7	61	61	61	59	59	59	59	59	59	59	59	59	59	58	58	56	56	56	56	56	56	56	56	55
S8	61	61	61	59	59	59	59	59	59	59	59	59	59	58	58	56	56	56	56	56	56	56	56	55
S9	61	61	61							59	59													56
S10	60	60	60								58	58												55
S11	60	60	60									58	58											55
S12	60	60	60										58	58										55
Total SPL, dB(A)	75	76	75	73	72	72	72	72	72	72	73	73	74	74	73	73	71	69	69	69	69	69	69	71
Exceedance	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN5 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49	49	49
N2	61	61	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	45	45	46
N3															43	43	43	43	44	44				
N4	58	58	58	58														42	42					
N5	57	57	57	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
N6	58	58	58	58	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
N7												40	40	40	41	41	41	41	41	41	41	41	41	41
N8												40	40	40	41	41	41	41	41	41	41	41	41	41
South Portion																								
S1	60	60	60	60	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S2		47	47	47																				
S3	59	59	59	59													43	43	43					
S4	58	58	58	58													42	42	42					
S5	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S6	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
S7	55	55	55	55	55	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40
S8	43	43	43	43	43																			
S9	55	55	55	55	55	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40
S10	56	56	56	56																	40	40	40	40
S11	55	55	55	55													39	39	39	40	40	40	40	40
S12	55	55	55	55													39	39	39	40	40	40	40	40
Total SPL, dB(A)	70	70	69	69	65	61	61	61	56	56	56	56	56	56	56	57	57	57	57	56	56	54	54	54
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN6 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	60	60	59	59	59	59	59	59	59	59	59	58	58	58	58	58	56	56	56	56	56	56	56	56
N2	61	61	60	60	60	60	60	60	60	60	60	59	59	59	59	59	57	57	57	57	57	57	57	57
N3		62	62	62																				
N4																								58
N5	66	66	66	64	64	64	64	64	64	64	64	64	64	64	64	64	64	61	61	61	61	61	61	61
N6	64	64	64	63	63	63	63	63	63	63	63	63	63	63	63	63	62	62	62	62	60	60	60	60
N7	68	68																						
N8	66	66																						
South Portion																								
S1	60	60	60	58	58	58	58	58	58	58	58	58	58	58	58	57	57	57	57	55	55	55	55	55
S2	61	61	61							59	59													56
S3	59	59	59								57	57												54
S4	62	62	62										60	60										57
S5	60	60	60	59	59	59	59	59	59	59	59	59	59	58	58	56	56	56	56	56	56	56	56	55
S6	59	59	59	58	58	58	58	58	58	57	57	57	57	57	57	55	55	55	55	55	55	55	55	54
S7	61	61	61	59	59	59	59	59	59	59	59	59	59	58	58	56	56	56	56	56	56	56	56	55
S8	59	59	59	58	58	58	58	58	58	58	58	58	58	57	57	55	55	55	55	55	55	55	55	54
S9	58	58	58							57	56													54
S10	62	62	62								61	61												58
S11	61	61	61									59	59											56
S12	59	59	59										58	57										55
Total SPL, dB(A)	75	75	74	71	70	70	70	70	70	70	71	71	71	72	71	71	70	67	67	67	67	67	67	69
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN6 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	41	41	41
N2	57	57	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	41	41	41
N3															42	42	42	42	43	43				
N4	58	58	58	58														42	42					
N5	61	61	61	61	60	60	60	60	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
N6	60	60	60	60	59	59	59	59	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
N7															48	48	48	48	48	48	48	48	48	48
N8															45	45	45	46	46	46	46	46	46	46
South Portion																								
S1	55	55	55	55	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39
S2		42	42	42																				
S3	56	56	56	56													40	40	40					
S4	54	54	54	54													38	38	38					
S5	57	57	57	57													41	41	41					
S5	55	55	55	55	55	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40
S6	43	43	43	43	43																			
S6	54	54	54	54	54	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	39	39	39
S7	41	41	41	41	41																			
S7	55	55	55	55	55	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40
S8	43	43	43	43	43																			
S8	54	54	54	54	54	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39
S9	42	42	42	42	42																			
S9	54	54	54	54																38	38	38		
S10	58	58	58	58															42	42	42	43	43	43
S11	56	56	56	56															40	40	40	41	41	41
S12	55	55	55	55																		39	39	39
Total SPL, dB(A)	69	69	69	69	65	63	63	63	54	54	55	55	55	55	55	56	56	56	56	56	56	54	54	54
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN7 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	73	73	71	71	71	71	71	71	71	71	71	71	71	71	71	71	68	68	68	68	68	68	68	68
N2	71	71	69	69	69	69	69	69	69	69	69	69	69	69	69	69	66	66	66	66	66	66	66	66
N3		67	67	67																				
N4																								64
N5	64	64	64	62	62	62	62	62	62	62	62	62	62	62	62	62	62	59	59	59	59	59	59	59
N6	65	65	65	64	64	64	64	64	64	64	64	64	63	63	63	63	63	61	61	61	61	61	61	61
N7	62	62																						
N8	63	63																						
South Portion																								
S1	76	76	76	74	74	74	74	74	74	74	74	74	74	74	74	73	73	73	73	71	71	71	71	71
S2	71	71	71								69	69												66
S3	71	71	71								69	69	69											66
S4	67	67	67										65	65										62
S5	69	69	69	67	67	67	67	67	67	67	67	67	67	66	66	64	64	64	64	64	64	64	64	64
S6	69	69	69	67	67	67	67	67	67	67	67	67	67	66	66	64	64	64	64	64	64	64	64	64
S7	66	66	66	65	65	65	65	65	65	64	64	64	64	64	64	62	62	62	62	62	62	62	62	61
S8	66	66	66	65	65	65	65	65	65	64	64	64	64	64	64	62	62	62	62	62	62	62	62	61
S9	67	67	67							65	65													62
S10	64	64	64							63	62													60
S11	64	64	64								63	62												60
S12	65	65	65										63	63										60
Total SPL, dB(A)	82	82	81	79	78	78	78	78	78	79	79	79	80	79	79	79	77	76	76	75	75	75	76	77
Exceedance	7	7	6	4	3	3	3	3	3	4	4	4	5	4	4	4	2	1	1	-	-	-	1	2

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN7 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	52	52	53	53	53
N2	66	66	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	51
N3															46	46	46	46	47	47				
N4	64	64	64	64														48	48					
N5	59	59	59	59	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
N6	61	61	61	61	60	60	60	60	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
N7													42	42	42	43	43	43	43	43	43	43	43	43
N8													43	43	43	44	44	44	44	44	44	44	44	44
South Portion																								
S1	71	71	71	71	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	55	55	55
S2		58	58	58																				
S3	66	66	66	66												51	51	51						
S4	66	66	66	66												50	50	50						
S5	62	62	62	62												46	46	46						
S5	64	64	64	64	64	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49
S6	51	51	51	51	51																			
S6	64	64	64	64	64	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	48
S7	51	51	51	51	51																			
S7	61	61	61	61	61	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46
S8	49	49	49	49	49																			
S8	61	61	61	61	61	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S9	48	48	48	48	48																			
S9	62	62	62	62																	46	46	46	
S10	60	60	60	60																	45	45	45	
S11	60	60	60	60																	44	44	44	
S12	60	60	60	60																	44	44	44	
Total SPL, dB(A)	77	77	76	76	70	65	65	65	62	62	62	62	62	62	62	63	63	63	63	62	62	60	60	60
Exceedance	2	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN8 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	71	71	69	69	69	69	69	69	69	69	69	69	69	69	69	69	66	66	66	66	66	66	66	66
N2	67	67	66	66	66	66	66	66	66	66	66	65	65	65	65	65	63	63	63	63	63	63	63	63
N3		65	65	65																				
N4																								60
N5	63	63	63	61	61	61	61	61	61	61	61	61	61	61	61	61	61	58	58	58	58	58	58	58
N6	63	63	63	62	62	62	62	62	62	62	62	62	62	62	62	62	61	61	61	61	59	59	59	59
N7	61	61																						
N8	61	61																						
South Portion																								
S1	67	67	67	65	65	65	65	65	65	65	65	65	65	65	65	64	64	64	64	62	62	62	62	62
S2	65	65	65								63	63												60
S3	64	64	64								63	62												60
S4	63	63	63										61	61										59
S5	64	64	64	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	58
S6	63	63	63	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	58
S7	62	62	62	61	61	61	61	61	61	60	60	60	60	60	60	58	58	58	58	58	58	58	58	57
S8	62	62	62	60	60	60	60	60	60	60	60	60	60	59	59	57	57	57	57	57	57	57	57	57
S9	62	62	62							60	60													58
S10	61	61	61							59	59													57
S11	61	61	61								59	59												56
S12	61	61	61									59	59											56
Total SPL, dB(A)	77	77	76	74	74	74	74	74	74	74	74	74	75	75	75	75	72	71	71	71	71	71	71	72
Exceedance	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN8 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	51	51	51
N2	63	63	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	48
N3															45	45	45	45	45	45				
N4	60	60	60	60														44	44					
N5	58	58	58	58	58	58	58	58	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
N6	59	59	59	59	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
N7													41	41	41	41	41	41	41	41	41	41	41	41
N8													41	41	41	42	42	42	42	42	42	42	42	42
South Portion																								
S1	62	62	62	62	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46
S2		49	49	49																				
S3	60	60	60	60													44	44	44					
S4	59	59	59	59													43	43	43					
S5	58	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S6	46	46	46	46	46																			
S7	58	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S8	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S9	44	44	44	44	44																			
S10	57	57	57	57																				
S11	57	57	57	57																				
S12	56	56	56	56																				
Total SPL, dB(A)	71	71	71	71	66	62	62	62	57	57	58	58	58	58	58	58	58	59	58	58	57	56	56	56
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN9 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	78	78	76	76	76	76	76	76	76	76	76	76	76	76	76	76	73	73	73	73	73	73	73	73
N2	71	71	70	70	70	70	70	70	70	70	70	69	69	69	69	69	67	67	67	67	67	67	67	67
N3		70	70	70																				
N4																								63
N5	67	67	67	66	66	66	66	66	66	66	66	66	65	65	65	65	65	63	63	63	63	63	63	63
N6	67	67	67	66	66	66	66	66	66	66	66	66	65	65	65	65	65	63	63	63	63	63	63	63
N7	64	64																						
N8	64	64																						
South Portion																								
S1	67	67	67	66	66	66	66	66	66	66	66	65	65	65	65	65	65	65	65	63	63	63	63	63
S2	66	66	66									64	64											61
S3	64	64	64									63	63											60
S4	65	65	65										63	63										60
S5	65	65	65	63	63	63	63	63	63	63	63	63	63	62	62	60	60	60	60	60	60	60	60	59
S6	64	64	64	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	58
S7	63	63	63	62	62	62	62	62	62	62	61	61	61	61	61	61	59	59	59	59	59	59	59	58
S8	62	62	62	61	61	61	61	61	61	61	61	61	61	60	60	58	58	58	58	58	58	58	58	57
S9	62	62	62									60	60											57
S10	63	63	63									61	61											58
S11	62	62	62									60	60											57
S12	61	61	61									60	59											57
Total SPL, dB(A)	81	81	80	79	78	78	78	78	78	78	78	79	78	80	80	80	80	76	76	76	75	75	75	76
Exceedance	6	6	5	4	3	3	3	3	3	3	3	4	3	5	5	5	5	1	1	1	-	-	-	1

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN9 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	57	57	58	58	58
N2	67	67	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	51	51	52
N3															49	49	49	49	50	50				
N4	63	63	63	63														47	47					
N5	63	63	63	63	62	62	62	62	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
N6	63	63	63	63	62	62	62	62	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
N7																								
N8																								
South Portion																								
S1	63	63	63	63	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
S2																								
S3	61	61	61	61																				
S4	60	60	60	60																				
S5	59	59	59	59	59	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S6	58	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S7	58	58	58	58	58	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S8	57	57	57	57	57	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
S9	57	57	57	57																				
S10	58	58	58	58																				
S11	57	57	57	57																				
S12	57	57	57	57																				
Total SPL, dB(A)	73	73	72	72	69	67	67	67	62	62	62	62	62	62	62	63	63	63	63	61	61	60	60	60
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN10 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	75	75	73	73	73	73	73	73	73	73	73	73	73	73	73	73	70	70	70	70	70	70	70	70
N2	73	73	71	71	71	71	71	71	71	71	71	71	71	71	71	71	68	68	68	68	68	68	68	68
N3		76	76	76																				
N4																								64
N5	72	72	72	70	70	70	70	70	70	70	70	70	70	70	70	70	70	67	67	67	67	67	67	67
N6	70	70	70	69	69	69	69	69	69	69	69	69	69	69	69	69	68	68	68	68	66	66	66	66
N7	67	67																						
N8	66	66																						
South Portion																								
S1	66	66	66	65	65	65	65	65	65	65	65	64	64	64	64	63	63	63	63	62	62	62	62	62
S2	66	66	66									65	64											62
S3	64	64	64									62	62											59
S4	66	66	66										64	64										61
S5	65	65	65	63	63	63	63	63	63	63	63	63	63	62	62	60	60	60	60	60	60	60	60	59
S6	63	63	63	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	58
S7	64	64	64	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	58
S8	62	62	62	61	61	61	61	61	61	61	61	61	61	60	60	58	58	58	58	58	58	58	58	57
S9	61	61	61																					57
S10	63	63	63									60	60											58
S11	62	62	62										61	61										58
S12	61	61	61											60	59									57
Total SPL, dB(A)	81	82	81	80	78	78	78	78	78	78	78	78	80	80	80	80	77	75	75	75	75	75	75	76
Exceedance	6	7	6	5	3	3	3	3	3	3	3	3	5	5	5	5	2	-	-	-	-	-	-	1

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN10 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	54	54	55	55	55
N2	68	68	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	53	53	53
N3															55	55	55	55	56	56				
N4	64	64	64	64														48	48					
N5	67	67	67	67	66	66	66	66	54	54	54	54	54	54	54	54	54	54	54	54	54	51	51	51
N6	66	66	66	66	65	65	65	65	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	50
N7													47	47	47	48	48	48	48	48	48	48	48	48
N8													45	45	45	46	46	46	46	46	46	46	46	46
South Portion																								
S1	62	62	62	62	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S2		48	48	48																				
S3	62	62	62	62													46	46	46					
S4	59	59	59	59													43	43	43					
S5	61	61	61	61													45	45	45					
S6	59	59	59	59	59	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S7	47	47	47	47	47																			
S8	58	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S9	46	46	46	46	46																			
S10	58	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S11	46	46	46	46	46																			
S12	57	57	57	57	57	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
S13	45	45	45	45	45																			
S14	57	57	57	57																41	41	41		
S15	58	58	58	58													42	42	42	43	43	43	43	43
S16	58	58	58	58													42	42	42	43	43	43	43	43
S17	57	57	57	57																41	41	41		
Total SPL, dB(A)	75	75	74	74	71	70	70	70	62	62	62	62	62	62	63	63	63	63	63	63	61	60	60	60
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN11 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	67	67	65	65	65	65	65	65	65	65	65	65	65	65	65	65	62	62	62	62	62	62	62	62
N2	67	67	66	66	66	66	66	66	66	66	66	65	65	65	65	65	63	63	63	63	63	63	63	63
N3		72	72	72																				
N4																								62
N5	78	78	78	76	76	76	76	76	76	76	76	76	76	76	76	76	76	73	73	73	73	73	73	73
N6	70	70	70	69	69	69	69	69	69	69	69	69	68	68	68	68	68	66	66	66	66	66	66	66
N7	73	73																						
N8	68	68																						
South Portion																								
S1	63	63	63	62	62	62	62	62	62	62	62	61	61	61	61	61	61	61	61	59	59	59	59	59
S2	64	64	64								62	62												60
S3	62	62	62									60	60											57
S4	65	65	65										63	63										60
S5	63	63	63	62	62	62	62	62	62	61	61	61	61	61	61	59	59	59	59	59	59	59	59	58
S6	62	62	62	60	60	60	60	60	60	60	60	60	60	59	59	57	57	57	57	57	57	57	57	56
S7	63	63	63	62	62	62	62	62	62	61	61	61	61	60	60	59	59	59	59	59	59	59	59	58
S8	61	61	61	60	60	60	60	60	60	60	60	60	60	59	59	57	57	57	57	57	57	57	57	56
S9	60	60	60								58	58												55
S10	64	64	64								62	62												60
S11	62	62	62									61	60											58
S12	60	60	60										59	59										56
Total SPL, dB(A)	81	82	81	79	78	78	78	78	78	78	78	78	78	80	80	80	80	75	75	75	75	75	75	76
Exceedance	6	7	6	4	3	3	3	3	3	3	3	3	3	5	5	5	5	-	-	-	-	-	-	1

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN11 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47	47	47
N2	63	63	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	48
N3															51	51	51	51	52	52				
N4	62	62	62	62														46	46					
N5	73	73	73	73	72	72	72	72	60	60	60	60	60	60	60	60	60	60	60	60	60	57	57	57
N6	66	66	66	66	65	65	65	65	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	50
N7																								
N8																								
South Portion																								
S1	59	59	59	59	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S2		45	45	45																				
S3	60	60	60	60																				
S4	57	57	57	57																				
S5	60	60	60	60																				
S5	58	58	58	58	58	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S6	45	45	45	45	45																			
S6	56	56	56	56	56	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
S7	44	44	44	44	44																			
S7	58	58	58	58	58	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S8	45	45	45	45	45																			
S8	56	56	56	56	56	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
S9	44	44	44	44	44																			
S9	55	55	55	55																				
S10	60	60	60	60																				
S10	58	58	58	58																				
S11	56	56	56	56																				
S12	56	56	56	56																				
Total SPL, dB(A)	76	76	76	76	74	73	73	73	62	62	62	62	62	63	63	63	63	63	63	63	63	61	61	61
Exceedance	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN12 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	64	64	63	63	63	63	63	63	63	63	63	62	62	62	62	62	60	60	60	60	60	60	60	60
N2	66	66	64	64	64	64	64	64	64	64	64	64	64	64	64	64	61	61	61	61	61	61	61	61
N3		67	67	67																				
N4																								62
N5	75	75	75	73	73	73	73	73	73	73	73	73	73	73	73	73	73	70	70	70	70	70	70	70
N6	71	71	71	70	70	70	70	70	70	70	70	70	69	69	69	69	69	67	67	67	67	67	67	67
N7	81	81																						
N8	72	72																						
South Portion																								
S1	63	63	63	62	62	62	62	62	62	62	62	61	61	61	61	60	60	60	60	59	59	59	59	59
S2	64	64	64									63	62											60
S3	61	61	61									60	60											57
S4	66	66	66										64	64										61
S5	64	64	64	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	58
S6	62	62	62	60	60	60	60	60	60	60	60	60	60	59	59	58	58	58	58	58	58	58	58	57
S7	64	64	64	62	62	62	62	62	62	62	62	62	62	61	61	59	59	59	59	59	59	59	59	58
S8	62	62	62	60	60	60	60	60	60	60	60	60	60	59	59	58	58	58	58	58	58	58	58	57
S9	60	60	60									59	59											56
S10	66	66	66									64	64											61
S11	63	63	63									62	62											59
S12	61	61	61										60	59										57
Total SPL, dB(A)	83	83	79	77	76	76	76	76	76	76	77	77	77	78	78	78	78	73	73	73	73	73	73	75
Exceedance	8	8	4	2	1	1	1	1	1	1	2	2	2	3	3	3	3	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN12 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	45	45	45
N2	61	61	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	46
N3															47	47	47	47	48	48				
N4	62	62	62	62													46	46						
N5	70	70	70	70	70	70	70	70	57	57	57	57	57	57	57	57	57	57	57	57	57	54	54	54
N6	67	67	67	67	66	66	66	66	53	53	53	53	53	53	53	53	53	53	53	53	53	51	51	51
N7											60	60	60	61	61	61	61	61	61	61	61	61	61	61
N8											51	51	51	52	52	52	52	52	52	52	52	52	52	52
South Portion																								
S1	59	59	59	59	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S2		45	45	45																				
S3	60	60	60	60												44	44	44						
S4	57	57	57	57												41	41	41						
S5	61	61	61	61												45	45	45						
S5	58	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S6	46	46	46	46	46																			
S6	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S7	44	44	44	44	44																			
S7	58	58	58	58	58	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S8	46	46	46	46	46																			
S8	57	57	57	57	57	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S9	44	44	44	44	44																			
S9	56	56	56	56																	40	40	40	
S10	61	61	61	61													45	45	45	46	46	46	46	46
S11	59	59	59	59													43	43	43	44	44	44	44	44
S12	57	57	57	57																41	41	41		
Total SPL, dB(A)	74	74	74	74	72	71	71	71	60	60	63	63	63	64	64	64	64	64	64	64	64	63	63	63
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN13 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	63	63	61	61	61	61	61	61	61	61	61	61	61	61	61	61	58	58	58	58	58	58	58	58
N2	64	64	63	63	63	63	63	63	63	63	63	63	63	63	63	63	60	60	60	60	60	60	60	60
N3		65	65	65																				
N4																								63
N5	67	67	67	66	66	66	66	66	66	66	66	66	66	66	66	66	66	63	63	63	63	63	63	63
N6	69	69	69	68	68	68	68	68	68	68	68	68	67	67	67	67	67	65	65	65	65	65	65	65
N7	71	71																						
N8	76	76																						
South Portion																								
S1	63	63	63	62	62	62	62	62	62	62	62	62	62	62	62	61	61	61	61	59	59	59	59	59
S2	65	65	65							64	64													61
S3	63	63	63								61	61												58
S4	69	69	69										67	67										64
S5	66	66	66	65	65	65	65	65	65	64	64	64	64	63	63	62	62	62	62	62	62	62	62	61
S6	64	64	64	63	63	63	63	63	63	62	62	62	62	62	62	60	60	60	60	60	60	60	60	59
S7	67	67	67	66	66	66	66	66	66	65	65	65	65	65	65	63	63	63	63	63	63	63	63	62
S8	65	65	65	63	63	63	63	63	63	63	63	63	63	62	62	60	60	60	60	60	60	60	60	60
S9	63	63	63							61	61													58
S10	73	73	73								71	71												68
S11	69	69	69									67	67											64
S12	65	65	65									64	63											61
Total SPL, dB(A)	81	81	79	75	74	74	74	74	74	74	74	74	76	76	76	75	75	74	71	71	71	71	71	75
Exceedance	6	6	4	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-

Appendix 5.2E - Construction Noise Calculation (Unmitigated)

NSR: CN13 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	43	43	43
N2	60	60	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	45
N3															45	45	45	45	46	46				
N4	63	63	63	63														47	47					
N5	63	63	63	63	62	62	62	62	50	50	50	50	50	50	50	50	50	50	50	50	50	47	47	47
N6	65	65	65	65	64	64	64	64	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49
N7																								
N8																								
South Portion																								
S1	59	59	59	59	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S2		46	46	46																				
S3	61	61	61	61																				
S4	58	58	58	58																				
S5	64	64	64	64																				
S6	61	61	61	61	61	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S7	48	48	48	48	48																			
S8	59	59	59	59	59	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
S9	46	46	46	46	46																			
S10	62	62	62	62	62	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
S11	49	49	49	49	49																			
S12	60	60	60	60	60	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S13	47	47	47	47	47																			
S14	58	58	58	58																				
S15	68	68	68	68																				
S16	64	64	64	64																				
S17	61	61	61	61																				
S18	52	52	52	52																				
S19	48	48	48	48																				
S20	45	45	45	45																				
Total SPL, dB(A)	75	75	75	75	70	67	67	67	58	58	60	60	60	61	61	62	62	62	62	62	62	61	61	61
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2F

**Construction Noise Level from the
Project (Unmitigated)**

Appendix 5.2F - Construction Noise Level from the Project (Unmitigated)

NSR	Noise Criteria, dB(A)	Max	SWL, dB(A)																							
			2017												2018											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24			
CN1	75	78	78	78	78	74	73	73	73	73	73	74	75	75	75	74	73	71	71	70	70	70	71	73		
CN2	75	79	79	79	79	76	76	76	76	76	76	76	76	77	77	76	76	74	73	73	73	73	73	75		
CN3	75	81	80	81	80	77	77	77	77	77	77	77	78	78	78	77	77	75	75	75	74	74	74	76		
CN4	75	77	76	77	76	73	73	73	73	73	73	73	74	74	74	74	71	70	70	70	70	70	70	72		
CN5	75	76	75	76	75	73	72	72	72	72	72	72	73	73	74	74	73	71	69	69	69	69	69	71		
CN6	75	75	75	75	74	71	70	70	70	70	70	70	71	71	71	71	70	67	67	67	67	67	67	69		
CN7	75	82	82	82	81	79	78	78	78	78	78	79	79	79	80	79	79	79	77	76	76	75	75	77		
CN8	75	77	77	77	76	74	74	74	74	74	74	74	74	74	75	75	75	75	72	71	71	71	71	72		
CN9	75	81	81	81	80	79	78	78	78	78	78	78	79	78	80	80	80	80	76	76	76	75	75	76		
CN10	75	82	81	82	81	80	78	78	78	78	78	78	78	78	80	80	80	80	77	75	75	75	75	76		
CN11	75	82	81	82	81	79	78	78	78	78	78	78	78	78	80	80	80	80	75	75	75	75	75	76		
CN12	75	83	83	83	79	77	76	76	76	76	76	76	77	77	77	78	78	78	78	73	73	73	73	75		
CN13	75	81	81	81	79	75	74	74	74	74	74	74	76	76	76	76	75	75	74	71	71	71	71	75		

NSR	Noise Criteria, dB(A)	Max	SWL, dB(A)																							
			2019												2020											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48			
CN1	75	78	73	73	73	73	68	61	61	61	57	57	57	57	57	57	57	59	59	59	59	58	58	56		
CN2	75	79	74	74	74	74	69	63	63	63	59	59	59	59	59	60	61	61	61	60	60	60	57	58		
CN3	75	81	76	76	75	75	70	64	64	64	60	60	61	61	61	61	62	62	62	61	61	61	59	59		
CN4	75	77	71	71	71	71	66	62	62	62	57	57	57	57	57	58	58	58	58	57	57	57	55	55		
CN5	75	76	70	70	69	69	65	61	61	61	56	56	56	56	56	56	57	57	57	57	56	56	54	54		
CN6	75	75	69	69	69	69	65	63	63	63	54	54	55	55	55	55	56	56	56	56	56	56	54	54		
CN7	75	82	77	77	76	76	70	65	65	65	62	62	62	62	62	62	63	63	63	63	62	62	60	60		
CN8	75	77	71	71	71	71	66	62	62	62	57	57	58	58	58	58	58	58	59	58	58	57	56	56		
CN9	75	81	73	73	72	72	69	67	67	67	62	62	62	62	62	62	63	63	63	63	63	61	60	60		
CN10	75	82	75	75	74	74	71	70	70	70	62	62	62	62	62	62	63	63	63	63	63	61	60	60		
CN11	75	82	76	76	76	76	74	73	73	73	62	62	62	62	62	63	63	63	63	63	63	63	61	61		
CN12	75	83	74	74	74	74	72	71	71	71	60	60	63	63	63	64	64	64	64	64	64	64	63	63		
CN13	75	81	75	75	75	75	70	67	67	67	58	58	60	60	60	61	61	62	62	62	62	62	61	61		

Appendix 5.2G

**Construction Plant Inventory
(Mitigated)**

Activity	PME	TM	SWL	No.	% on time	Barrier Correction	Sub-SWL	Total SWL	
A1	Site Preparation	Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	-10	93	113
		Breaker, mini-robot mounted	Others*	115	2	30%	-5	108	
		Dump Truck, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	2	50%	0	105	
		Poker, vibratory, hand-held (electric)	Others*	102	1	20%	-5	90	
		Concrete lorry mixer	CNP 044	109	2	30%	0	107	
		Water pump (electric)	CNP 281	88	2	100%	0	91	
		Excavator/ loader, wheeled/ tracked	EPD-01431	103	2	30%	0	101	
		Backhoe	CNP 081	109	2	50%	-5	104	
A2	Pilling	Crane, moblie (diesel)	EPD-01477	104	2	50%	-5	99	111
		Pilling, large diameter bored, reverse circulation drill	CNP 166	100	2	50%	-10	90	
		Pilling, large diameter bored, oscillator	CNP 165	115	2	50%	-10	105	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	-10	93	
		Air compressor, air flow > 30m3/min	CNP 003	104	2	100%	-10	97	
		Concrete lorry mixer	CNP 044	109	1	50%	0	106	
		Dump Truck, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	2	50%	0	105	
Excavator/ loader, wheeled/ tracked	EPD-01431	103	2	30%	0	101			
A3	Pile Cap Construction	Crane, moblie (diesel)	EPD-01477	104	2	50%	-5	99	113
		Concrete pump, stationary/ lorry mounted	CNP 047	109	1	50%	-10	96	
		Poker, vibratory, hand-held (electric)	Others*	102	1	20%	-5	90	
		Bar bender and cutter (electric)	CNP 021	90	1	20%	0	83	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	-10	93	
		Air compressor, air flow > 30m3/min	CNP 003	104	2	100%	-10	97	
		Concrete lorry mixer	CNP 044	109	1	50%	0	106	
		Saw, circular, wood	BSS501Z**	103	2	30%	-5	96	
		Dump Truck, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	2	50%	0	105	
		Water pump (electric)	CNP 281	88	2	100%	0	91	
		Excavator/ loader, wheeled/ tracked	CNP 081	112	2	30%	0	110	
Breaker, mini-robot mounted	Others*	115	1	10%	-5	100			
A4	Back-filling & Basement Structures	Crane, moblie (diesel)	EPD-01477	104	1	50%	-5	96	112
		Concrete pump, stationary/ lorry mounted	CNP 047	109	1	20%	-10	92	
		Poker, vibratory, hand-held (electric)	Others*	102	1	20%	-5	90	
		Bar bender and cutter (electric)	CNP 021	90	1	20%	0	83	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	-10	93	
		Concrete lorry mixer	CNP 044	109	1	20%	0	102	
		Power rammer (petrol)	CNP169	108	2	80%	-5	105	
		Compactor, vibratory	CNP 050	105	2	80%	-5	102	
		Roller, vibratory	CNP 185	108	1	80%	0	107	
		Water pump (electric)	CNP 281	88	2	30%	0	86	
		Dump Truck, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	2	50%	0	105	
Excavator/ loader, wheeled/ tracked	EPD-01431	103	2	30%	0	101			
A5	Superstructure	Crane, tower (electric)	CNP 049	95	2	80%	0	97	112
		Crane, moblie (diesel)	EPD-01477	104	2	80%	-5	101	
		Crane Lorry, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	1	50%	0	102	
		Concrete pump, stationary/ lorry mounted	CNP 047	109	1	50%	-10	96	
		Poker, vibratory, hand-held (electric)	Others*	102	3	50%	-5	99	
		Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87	
		Saw, circular, wood	BSS501Z**	103	2	30%	-5	96	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	-10	93	
		Air compressor, air flow > 30m3/min	CNP 003	104	1	100%	-10	94	
		Concrete lorry mixer	CNP 044	109	2	50%	0	109	
		Drill/grinder, hand-held (electric)	CNP 065	98	5	30%	0	100	
		Water pump (electric)	CNP 281	88	2	30%	0	86	
		Excavator/ loader, wheeled/ tracked	EPD-01431	103	2	30%	0	101	
Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93			
A5a	Steel Frame and Retractable Roof of Main Stadium	Crane, tower (electric)	CNP 049	95	2	80%	0	97	108
		Crane, moblie (diesel)	EPD-01477	104	3	80%	-5	103	
		Crane Lorry, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	1	50%	0	102	
		Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87	
		Saw, circular, wood	BSS501Z**	103	2	30%	-5	96	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	-10	93	
		Air compressor, air flow > 30m3/min	CNP 003	104	1	100%	-10	94	
		Drill/grinder, hand-held (electric)	CNP 065	98	7	30%	0	101	
Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93			

Activity	PME	TM	SWL	No.	% on time	Barrier Correction	Sub-SWL	Total SWL	
A5b	Steel Roof Frame of Indoor Sports Centre	Crane, tower (electric)	CNP 049	95	2	80%	0	97	108
		Crane, mobile (diesel)	EPD-01477	104	3	80%	-5	103	
		Crane Lorry, 5.5 tonne <gross vehicle weight =< 38 tonne	Others*	105	1	50%	0	102	
		Bar bender and cutter (electric)	CNP 021	90	1	50%	0	87	
		Saw, circular, wood	BSS501Z**	103	2	30%	-5	96	
		Generator, silenced, 75 dB(A) at 7m	CNP 102	100	2	100%	-10	93	
		Air compressor, air flow > 30m ³ /min	CNP 003	104	1	100%	-10	94	
		Drill/grinder, hand-held (electric)	CNP 065	98	7	30%	0	101	
A6	Builder's Work	Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93	104
		Drill/grinder, hand-held (electric)	CNP 065	98	7	50%	0	103	
		Welder/Generator, portable	CNP107***	90	2	50%	0	90	
		Lifting Platform (electric)	CNP 122	95	2	50%	0	95	
A7a	External Works	Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93	102
		Drill/grinder, hand-held (electric)	CNP 065	98	3	50%	0	100	
		Welder/Generator, portable	CNP107***	90	2	50%	0	90	
		Lifting Platform (electric)	CNP 122	95	2	50%	0	95	
A7b	Landscaping Works	Drill/grinder, hand-held (electric)	CNP 065	98	5	50%	0	102	103
		Welder/Generator, portable	CNP107***	90	2	50%	0	90	
		Hoist, passenger/ material (electric)	CNP 122	95	2	30%	0	93	

Remark:

Acoustic Mat will be applied on piling machines, 10 dB(A) reduction can be achieved.

Enclosure/ Shed/ Silencer will be applied on Generator, Air Compressor and Concrete Pump, 10 dB(A) reduction can be achieved.

Movable Noise Barrier will be applied on the other plants, 5 dB(A) reduction can be achieved.

* Others - EPD website: http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf

** BSS501Z - <http://www.makitatools.com/en-us/Modules/Home/Default.aspx>

***Reference to EIA report of AEIAR-171/2013 - Central Kowloon Route, Appendix 5.4A

Appendix 5.2H

**SWL of Construction Activities
(Mitigated)**

Appendix 5.2H - SWL of Construction Activities (Mitigated)

Zone	SWL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	113	113	111	111	111	111	111	111	111	111	111	113	113	113	113	113	112	112	112	112	112	112	112	112
N2	113	113	111	111	111	111	111	111	111	111	111	113	113	113	113	113	112	112	112	112	112	112	112	112
N3		113	113	113																				
N4																								112
N5	113	113	113	111	111	111	111	111	111	111	111	111	113	113	113	113	113	112	112	112	112	112	112	112
N6	113	113	113	111	111	111	111	111	111	111	111	111	113	113	113	113	113	112	112	112	112	112	112	112
N7	113	113																						
N8	113	113																						
South Portion																								
S1	113	113	113	111	111	111	111	111	111	111	111	113	113	113	113	112	112	112	112	112	112	112	112	112
S2	113	113	113								111	113												112
S3	113	113	113									111	113											112
S4	113	113	113										111	113										112
S5	113	113	113	111	111	111	111	111	111	113	113	113	113	112	112	112	112	112	112	112	112	112	112	108
S6	113	113	113	111	111	111	111	111	111	113	113	113	113	112	112	112	112	112	112	112	112	112	112	108
S7	113	113	113	111	111	111	111	111	111	113	113	113	113	112	112	112	112	112	112	112	112	112	112	108
S8	113	113	113	111	111	111	111	111	111	113	113	113	113	112	112	112	112	112	112	112	112	112	112	108
S9	113	113	113								111	113												112
S10	113	113	113									111	113											112
S11	113	113	113										111	113										112
S12	113	113	113											111	113									112

Appendix 5.2H - SWL of Construction Activities (Mitigated)

Zone	SWL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	103	103	103
N2	112	112	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	103
N3															102	102	102	102	103	103				
N4	112	112	112	112														102	102					
N5	112	112	112	112	108	108	108	108	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
N6	112	112	112	112	108	108	108	108	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
N7													102	102	102	103	103	103	103	103	103	103	103	103
N8													102	102	102	103	103	103	103	103	103	103	103	103
South Portion																								
S1	112	112	112	112	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S2	112	112	112	112													102	102	102					
S3	112	112	112	112													102	102	102					
S4	112	112	112	112													102	102	102					
S5	108	108	108	108	108	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S6	104	104	104	104	104																			
S6	108	108	108	108	108	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S7	104	104	104	104	104																			
S7	108	108	108	108	108	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S8	104	104	104	104	104																			
S8	108	108	108	108	108	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104	102	102	102
S9	112	112	112	112															102	102	102			
S10	112	112	112	112														102	102	102	103	103	103	103
S11	112	112	112	112														102	102	102	103	103	103	103
S12	112	112	112	112															102	102	102			

Appendix 5.2I

**Construction Noise Calculation
(Mitigated)**

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN1 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	55	55	53	53	53	53	53	53	53	53	53	55	55	55	55	55	54	54	54	54	54	54	54	54
N2	54	54	53	53	53	53	53	53	53	53	53	55	55	55	55	55	54	54	54	54	54	54	54	54
N3		52	52	52																				
N4																								53
N5	50	50	50	49	49	49	49	49	49	49	49	49	51	51	51	51	51	50	50	50	50	50	50	50
N6	52	52	52	50	50	50	50	50	50	50	50	50	52	52	52	52	52	51	51	51	51	51	51	51
N7	50	50																						
N8	51	51																						
South Portion																								
S1	58	58	58	57	57	57	57	57	57	57	57	59	59	59	59	58	58	58	58	58	58	58	58	58
S2	56	56	56									55	57											56
S3	60	60	60									58	60											59
S4	53	53	53										52	54										53
S5	56	56	56	54	54	54	54	54	54	56	56	56	56	55	55	55	55	55	55	55	55	55	55	51
S6	58	58	58	57	57	57	57	57	57	59	59	59	59	58	58	58	58	58	58	58	58	58	58	54
S7	55	55	55	53	53	53	53	53	53	55	55	55	55	54	54	54	54	54	54	54	54	54	54	50
S8	56	56	56	55	55	55	55	55	55	57	57	57	57	56	56	56	56	56	56	56	56	56	56	52
S9	59	59	59																					58
S10	53	53	53										51	53										52
S11	53	53	53										52	54										53
S12	55	55	55										54	56										55
Total SPL, dB(A)	68	68	68	64	64	64	64	64	64	66	66	67	68	67	66	66	65	65	65	65	65	65	65	67
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN1 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	45	45	45
N2	54	54	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
N3															41	41	41	41	42	42				
N4	53	53	53	53														43	43					
N5	50	50	50	50	46	46	46	46	42	42	42	42	42	42	42	42	42	42	42	42	42	40	40	40
N6	51	51	51	51	47	47	47	47	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
N7													39	39	39	40	40	40	40	40	40	40	40	40
N8													40	40	40	41	41	41	41	41	41	41	41	41
South Portion																								
S1	58	58	58	58	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	48	48	48
S2	56	56	56	56												46	46	46						
S3	59	59	59	59												49	49	49						
S4	53	53	53	53												43	43	43						
S5	51	51	51	51	51	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
S6	48	48	48	48	48																			
S7	54	54	54	54	54	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	48	48	48
S8	50	50	50	50	50	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S9	47	47	47	47	47																			
S10	52	52	52	52	52	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S11	48	48	48	48	48																			
S12	58	58	58	58															48	48	48			
S13	52	52	52	52												42	42	42	43	43	43	43	43	43
S14	53	53	53	53												42	42	42	43	43	43	43	43	43
S15	55	55	55	55														45	45	45				
Total SPL, dB(A)	67	67	67	67	61	58	58	58	57	57	57	57	57	57	57	59	59	59	59	58	58	55	55	56
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN2 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	59	59	58	58	58	58	58	58	58	58	58	60	60	60	60	60	59	59	59	59	59	59	59	59
N2	58	58	57	57	57	57	57	57	57	57	57	59	59	59	59	59	58	58	58	58	58	58	58	58
N3		55	55	55																				
N4																								55
N5	52	52	52	51	51	51	51	51	51	51	51	51	53	53	53	53	53	52	52	52	52	52	52	52
N6	54	54	54	52	52	52	52	52	52	52	52	52	54	54	54	54	54	53	53	53	53	53	53	53
N7	51	51																						
N8	52	52																						
South Portion																								
S1	62	62	62	60	60	60	60	60	60	60	60	62	62	62	62	61	61	61	61	61	61	61	61	61
S2	59	59	59									57	59											58
S3	60	60	60									59	61											60
S4	55	55	55										54	56										55
S5	57	57	57	56	56	56	56	56	56	58	58	58	58	57	57	57	57	57	57	57	57	57	57	53
S6	59	59	59	57	57	57	57	57	57	59	59	59	59	58	58	58	58	58	58	58	58	58	58	54
S7	56	56	56	54	54	54	54	54	54	56	56	56	56	55	55	55	55	55	55	55	55	55	55	51
S8	56	56	56	54	54	54	54	54	54	56	56	56	56	55	55	55	55	55	55	55	55	55	55	51
S9	57	57	57									55	57											56
S10	53	53	53									52	54											53
S11	53	53	53									52	54											53
S12	54	54	54										53	55										54
Total SPL, dB(A)	70	70	69	66	66	66	66	66	66	67	68	69	70	69	69	68	67	67	67	67	67	67	67	69
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN2 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	49	49	49
N2	58	58	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	48	48	49
N3															44	44	44	44	45	45				
N4	55	55	55	55														45	45					
N5	52	52	52	52	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
N6	53	53	53	53	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
N7													40	40	40	41	41	41	41	41	41	41	41	41
N8													41	41	41	42	42	42	42	42	42	42	42	42
South Portion																								
S1	61	61	61	61	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	51	51	51
S2	58	58	58	58												48	48	48						
S3	60	60	60	60												50	50	50						
S4	55	55	55	55												44	44	44						
S5	53	53	53	53	53	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
S6	54	54	54	54	54	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	48	48	48
S7	51	51	51	51	51	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
S8	51	51	51	51	51	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
S9	56	56	56	56															46	46	46			
S10	53	53	53	53												43	43	43	43	43	43	43	43	43
S11	53	53	53	53												43	43	43	43	43	43	43	43	43
S12	54	54	54	54														44	44	44				
Total SPL, dB(A)	68	68	68	68	62	60	60	60	59	59	59	59	59	59	60	61	61	61	60	60	60	57	57	58
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN3 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	60	60	59	59	59	59	59	59	59	59	59	61	61	61	61	61	59	59	59	59	59	59	59	59
N2	59	59	58	58	58	58	58	58	58	58	58	60	60	60	60	60	59	59	59	59	59	59	59	59
N3		56	56	56																				
N4																								56
N5	53	53	53	52	52	52	52	52	52	52	52	52	53	53	53	53	53	52	52	52	52	52	52	52
N6	54	54	54	53	53	53	53	53	53	53	53	53	55	55	55	55	55	54	54	54	54	54	54	54
N7	52	52																						
N8	53	53																						
South Portion																								
S1	64	64	64	62	62	62	62	62	62	62	62	64	64	64	64	63	63	63	63	63	63	63	63	63
S2	60	60	60									59	61											59
S3	62	62	62									60	62											61
S4	56	56	56										55	56										55
S5	59	59	59	57	57	57	57	57	57	59	59	59	59	58	58	58	58	58	58	58	58	58	58	54
S6	59	59	59	58	58	58	58	58	58	60	60	60	60	59	59	59	59	59	59	59	59	59	59	55
S7	56	56	56	55	55	55	55	55	55	56	56	56	56	56	56	55	55	55	55	55	55	55	55	51
S8	56	56	56	55	55	55	55	55	55	57	57	57	57	56	56	56	56	56	56	56	56	56	56	52
S9	58	58	58									57	59											58
S10	54	54	54									52	54											53
S11	54	54	54									52	54											53
S12	55	55	55										53	55										54
Total SPL, dB(A)	71	71	71	67	67	67	67	67	67	68	69	70	71	70	70	70	68	68	68	68	68	68	68	70
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN3

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	49	49	50	50	50
N2	59	59	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	50
N3															45	45	45	45	46	46				
N4	56	56	56	56														46	46					
N5	52	52	52	52	48	48	48	48	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
N6	54	54	54	54	50	50	50	50	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
N7													41	41	41	42	42	42	42	42	42	42	42	42
N8													42	42	42	43	43	43	43	43	43	43	43	43
South Portion																								
S1	63	63	63	63	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	53	53	53
S2	59	59	59	59												49	49	49						
S3	61	61	61	61												51	51	51						
S4	55	55	55	55												45	45	45						
S5	54	54	54	54	54	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	48
S6	55	55	55	55	55	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	48
S7	51	51	51	51	51	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
S8	52	52	52	52	52	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S9	58	58	58	58															47	47	47			
S10	53	53	53	53												43	43	43	44	44	44	44	44	44
S11	53	53	53	53												43	43	43	44	44	44	44	44	44
S12	54	54	54	54														44	44	44				
Total SPL, dB(A)	69	70	69	69	63	61	61	61	60	60	61	61	61	61	61	62	62	62	61	61	61	59	59	59
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN4

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	59	59	58	58	58	58	58	58	58	58	58	60	60	60	60	60	59	59	59	59	59	59	59	59
N2	56	56	55	55	55	55	55	55	55	55	55	57	57	57	57	57	56	56	56	56	56	56	56	56
N3		54	54	54																				
N4																								53
N5	52	52	52	51	51	51	51	51	51	51	51	51	53	53	53	53	53	52	52	52	52	52	52	52
N6	53	53	53	51	51	51	51	51	51	51	51	51	53	53	53	53	53	52	52	52	52	52	52	52
N7	50	50																						
N8	51	51																						
South Portion																								
S1	57	57	57	56	56	56	56	56	56	56	56	58	58	58	58	57	57	57	57	57	57	57	57	57
S2	55	55	55									54	56											55
S3	55	55	55										54	55										54
S4	53	53	53											52	53									52
S5	54	54	54	53	53	53	53	53	53	55	55	55	55	54	54	54	54	54	54	54	54	54	54	50
																								46
S6	54	54	54	53	53	53	53	53	53	55	55	55	55	54	54	54	54	54	54	54	54	54	54	50
																								46
S7	53	53	53	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
																								44
S8	53	53	53	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
																								44
S9	53	53	53								52	53												52
S10	51	51	51									50	52											51
S11	51	51	51										50	52										51
S12	52	52	52											50	52									51
Total SPL, dB(A)	67	67	66	64	63	63	63	63	63	64	65	66	67	67	67	67	65	64	64	64	64	64	64	66
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN4

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49	49	49
N2	56	56	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
N3																43	43	43	43	44	44			
N4	53	53	53	53														43	43					
N5	52	52	52	52	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
N6	52	52	52	52	48	48	48	48	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
N7													40	40	40	40	40	40	40	40	40	40	40	40
N8													40	40	40	41	41	41	41	41	41	41	41	41
South Portion																								
S1	57	57	57	57	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
S2	55	55	55	55												44	44	44						
S3	54	54	54	54												44	44	44						
S4	52	52	52	52												42	42	42						
S5	50	50	50	50	50	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
S6	46	46	46	46	46																			
S7	50	50	50	50	50	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
S8	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S9	44	44	44	44	44																			
S10	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S11	44	44	44	44	44																			
S12	52	52	52	52															42	42	42			
S13	51	51	51	51												41	41	41	41	41	41	41	41	41
S14	51	51	51	51												40	40	40	41	41	41	41	41	41
S15	51	51	51	51														41	41	41				
Total SPL, dB(A)	65	65	65	65	60	58	58	58	57	57	57	57	57	57	57	58	58	58	58	57	57	55	55	55
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CNS Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	59	59	58	58	58	58	58	58	58	58	58	60	60	60	60	60	59	59	59	59	59	59	59	59
N2	55	55	54	54	54	54	54	54	54	54	54	56	56	56	56	56	55	55	55	55	55	55	55	55
N3		54	54	54																				
N4																								52
N5	52	52	52	51	51	51	51	51	51	51	51	51	53	53	53	53	53	52	52	52	52	52	52	52
N6	52	52	52	51	51	51	51	51	51	51	51	51	53	53	53	53	53	52	52	52	52	52	52	52
N7	51	51																						
N8	50	50																						
South Portion																								
S1	55	55	55	53	53	53	53	53	53	53	53	55	55	55	55	54	54	54	54	54	54	54	54	54
S2	53	53	53								52	54												53
S3	53	53	53									51	53											52
S4	52	52	52										50	52										51
S5	52	52	52	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
																							44	44
S6	52	52	52	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
																							44	44
S7	51	51	51	50	50	50	50	50	50	52	52	52	52	51	51	50	50	50	50	50	50	50	50	47
																							43	43
S8	51	51	51	49	49	49	49	49	49	51	51	51	51	50	50	50	50	50	50	50	50	50	50	46
																							43	43
S9	51	51	51							50	51													50
S10	50	50	50								49	51												50
S11	50	50	50									48	50											49
S12	50	50	50										48	50										49
Total SPL, dB(A)	66	66	65	63	62	62	62	62	62	63	64	65	66	66	66	66	64	63	63	63	63	63	63	65
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CNS Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49	49	49
N2	55	55	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	45	45	46
N3															43	43	43	43	44	44				
N4	52	52	52	52														42	42					
N5	52	52	52	52	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
N6	52	52	52	52	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
N7													40	40	40	41	41	41	41	41	41	41	41	41
N8													40	40	40	41	41	41	41	41	41	41	41	41
South Portion																								
S1	54	54	54	54	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S2	53	53	53	53												43	43	43						
S3	52	52	52	52												42	42	42						
S4	51	51	51	51												41	41	41						
S5	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S6	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
S7	47	47	47	47	47	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40
S8	46	46	46	46	46	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40
S9	50	50	50	50															40	40	40			
S10	50	50	50	50												39	39	39	40	40	40	40	40	40
S11	49	49	49	49												39	39	39	40	40	40	40	40	40
S12	49	49	49	49														39	39	39				
Total SPL, dB(A)	64	64	63	63	58	57	57	57	56	56	56	56	56	56	56	57	57	57	57	56	56	54	54	54
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN6 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	51	51	49	49	49	49	49	49	49	49	49	51	51	51	51	51	50	50	50	50	50	50	50	50
N2	51	51	50	50	50	50	50	50	50	50	50	52	52	52	52	52	51	51	51	51	51	51	51	51
N3		53	53	53																				
N4																								52
N5	56	56	56	55	55	55	55	55	55	55	55	55	56	56	56	56	56	55	55	55	55	55	55	55
N6	55	55	55	53	53	53	53	53	53	53	53	53	55	55	55	55	55	54	54	54	54	54	54	54
N7	58	58																						
N8	56	56																						
South Portion																								
S1	50	50	50	49	49	49	49	49	49	49	49	51	51	51	51	50	50	50	50	49	49	49	49	49
S2	51	51	51								49	51												50
S3	49	49	49									48	49											48
S4	52	52	52										50	52										51
S5	51	51	51	49	49	49	49	49	49	51	51	51	51	50	50	50	50	50	50	50	50	50	50	46
																								43
S6	49	49	49	48	48	48	48	48	48	50	50	50	50	49	49	49	49	49	49	49	49	49	49	45
																								41
S7	51	51	51	50	50	50	50	50	50	51	51	51	51	51	51	50	50	50	50	50	50	50	50	46
																								43
S8	50	50	50	48	48	48	48	48	48	50	50	50	50	49	49	49	49	49	49	49	49	49	49	45
																								42
S9	48	48	48							47	49													48
S10	53	53	53								51	53												52
S11	51	51	51									50	52											51
S12	50	50	50										48	50										49
Total SPL, dB(A)	65	65	64	61	60	60	60	60	60	61	62	63	64	64	64	64	63	61	61	61	61	61	61	63
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN6

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	41	41	41
N2	51	51	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	41	41	41
N3															42	42	42	42	43	43				
N4	52	52	52	52													42	42						
N5	55	55	55	55	51	51	51	51	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
N6	54	54	54	54	50	50	50	50	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
N7													48	48	48	48	48	48	48	48	48	48	48	48
N8													45	45	45	46	46	46	46	46	46	46	46	46
South Portion																								
S1	49	49	49	49	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39
S2	50	50	50	50												40	40	40						
S3	48	48	48	48												38	38	38						
S4	51	51	51	51												41	41	41						
S5	46	46	46	46	46	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40
S6	45	45	45	45	45	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	39	39	39
S7	46	46	46	46	46	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	40	40	40
S8	45	45	45	45	45	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	39	39	39
S9	48	48	48	48															38	38	38			
S10	52	52	52	52												42	42	42	43	43	43	43	43	43
S11	51	51	51	51												40	40	40	41	41	41	41	41	41
S12	49	49	49	49														39	39	39				
Total SPL, dB(A)	63	63	63	63	58	57	57	57	54	54	55	55	55	55	55	56	56	56	56	56	56	54	54	54
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN7 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	63	63	62	62	62	62	62	62	62	62	62	64	64	64	64	64	63	63	63	63	63	63	63	63
N2	61	61	60	60	60	60	60	60	60	60	60	61	61	61	61	61	60	60	60	60	60	60	60	60
N3		57	57	57																				
N4																								58
N5	54	54	54	53	53	53	53	53	53	53	53	53	54	54	54	54	54	53	53	53	53	53	53	53
N6	56	56	56	54	54	54	54	54	54	54	54	54	56	56	56	56	56	55	55	55	55	55	55	55
N7	52	52																						
N8	54	54																						
South Portion																								
S1	66	66	66	65	65	65	65	65	65	65	65	67	67	67	67	66	66	66	66	65	65	65	65	65
S2	61	61	61									60	62											61
S3	61	61	61									60	61											60
S4	57	57	57										56	58										56
S5	59	59	59	58	58	58	58	58	58	60	60	60	60	59	59	59	59	59	59	59	59	59	59	55
S6	59	59	59	58	58	58	58	58	58	60	60	60	60	59	59	59	59	59	59	59	59	59	59	55
S7	57	57	57	55	55	55	55	55	55	57	57	57	57	56	56	56	56	56	56	56	56	56	56	52
S8	56	56	56	55	55	55	55	55	55	57	57	57	57	56	56	56	56	56	56	56	56	56	56	52
S9	57	57	57																					56
S10	55	55	55									56	57											54
S11	54	54	54									53	55											54
S12	55	55	55									53	55											54
Total SPL, dB(A)	72	72	72	69	69	69	69	69	69	70	70	72	72	72	72	71	70	70	70	70	70	70	70	71
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN7

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	52	52	53	53	53
N2	60	60	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	51
N3															46	46	46	46	47	47				
N4	58	58	58	58														48	48					
N5	53	53	53	53	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
N6	55	55	55	55	51	51	51	51	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	45
N7													42	42	42	43	43	43	43	43	43	43	43	43
N8													43	43	43	44	44	44	44	44	44	44	44	44
South Portion																								
S1	65	65	65	65	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	55	55	55
S2		58	58	58																				
S3	61	61	61	61												51	51	51						
S4	60	60	60	60												50	50	50						
S5	56	56	56	56												46	46	46						
S5	55	55	55	55	55	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49
S6	51	51	51	51	51																			
S6	55	55	55	55	55	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	48	48	48
S7	51	51	51	51	51																			
S7	52	52	52	52	52	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46
S8	49	49	49	49	49																			
S8	52	52	52	52	52	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S9	48	48	48	48	48																			
S9	56	56	56	56															46	46	46			
S10	54	54	54	54												44	44	44	45	45	45	45	45	45
S11	54	54	54	54												44	44	44	45	45	45	45	45	45
S12	54	54	54	54												44	44	44	44	44	44			
Total SPL, dB(A)	71	71	70	70	64	63	63	63	62	62	62	62	62	62	62	63	63	63	63	62	62	60	60	60
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN8

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	61	61	59	59	59	59	59	59	59	59	59	61	61	61	61	61	60	60	60	60	60	60	60	60
N2	57	57	56	56	56	56	56	56	56	56	56	58	58	58	58	58	57	57	57	57	57	57	57	57
N3		55	55	55																				
N4																								54
N5	53	53	53	52	52	52	52	52	52	52	52	52	54	54	54	54	54	53	53	53	53	53	53	53
N6	54	54	54	52	52	52	52	52	52	52	52	52	54	54	54	54	54	53	53	53	53	53	53	53
N7	51	51																						
N8	52	52																						
South Portion																								
S1	57	57	57	56	56	56	56	56	56	56	56	58	58	58	58	57	57	57	57	56	56	56	56	56
S2	55	55	55									54	55											54
S3	55	55	55									53	55											54
S4	53	53	53										52	54										53
S5	54	54	54	53	53	53	53	53	53	54	54	54	54	54	54	53	53	53	53	53	53	53	53	49
																								46
S6	54	54	54	52	52	52	52	52	52	54	54	54	54	53	53	53	53	53	53	53	53	53	53	49
																								46
S7	52	52	52	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
																								44
S8	52	52	52	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
																								44
S9	52	52	52								51	53												52
S10	51	51	51									50	52											51
S11	51	51	51										50	52										50
S12	51	51	51											50	52									51
Total SPL, dB(A)	67	67	67	65	64	64	64	64	64	65	65	67	68	68	68	68	66	65	65	65	65	65	65	66
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN8

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	51	51	51
N2	57	57	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	48
N3															45	45	45	45	45	45				
N4	54	54	54	54														44	44					
N5	53	53	53	53	49	49	49	49	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
N6	53	53	53	53	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
N7													41	41	41	41	41	41	41	41	41	41	41	41
N8													41	41	41	42	42	42	42	42	42	42	42	42
South Portion																								
S1	56	56	56	56	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	46	46	46
S2	54	54	54	54												44	44	44						
S3	54	54	54	54												44	44	44						
S4	53	53	53	53												43	43	43						
S5	49	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S6	49	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S7	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S8	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S9	52	52	52	52															42	42	42			
S10	51	51	51	51												41	41	41	41	41	41	41	41	41
S11	50	50	50	50												40	40	40	41	41	41	41	41	41
S12	51	51	51	51														40	40	40				
Total SPL, dB(A)	65	65	65	65	60	58	58	58	57	57	58	58	58	58	58	58	58	59	58	58	57	56	56	56
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN9 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	68	68	67	67	67	67	67	67	67	67	67	68	68	68	68	68	67	67	67	67	67	67	67	67
N2	62	62	60	60	60	60	60	60	60	60	60	62	62	62	62	62	61	61	61	61	61	61	61	61
N3		60	60	60																				
N4																								57
N5	58	58	58	56	56	56	56	56	56	56	56	56	58	58	58	58	58	57	57	57	57	57	57	57
N6	58	58	58	56	56	56	56	56	56	56	56	56	58	58	58	58	58	57	57	57	57	57	57	57
N7	55	55																						
N8	54	54																						
South Portion																								
S1	57	57	57	56	56	56	56	56	56	56	56	58	58	58	58	57	57	57	57	57	57	57	57	57
S2	56	56	56									55	57											56
S3	55	55	55									53	55											54
S4	55	55	55										54	55										54
S5	55	55	55	53	53	53	53	53	53	55	55	55	55	55	55	54	54	54	54	54	54	54	54	50
S6	54	54	54	53	53	53	53	53	53	55	55	55	55	54	54	53	53	53	53	53	53	53	53	50
S7	54	54	54	52	52	52	52	52	52	54	54	54	54	53	53	53	53	53	53	53	53	53	53	49
S8	53	53	53	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
S9	52	52	52																					52
S10	53	53	53										51	53										52
S11	52	52	52										51	53										51
S12	52	52	52										50	52										51
Total SPL, dB(A)	71	71	70	69	69	69	69	69	69	69	69	71	73	73	73	73	70	70	70	70	70	70	70	70
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN9

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	57	57	58	58	58
N2	61	61	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	51	51	52
N3															49	49	49	49	50	50				
N4	57	57	57	57														47	47					
N5	57	57	57	57	53	53	53	53	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
N6	57	57	57	57	53	53	53	53	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
N7													44	44	44	45	45	45	45	45	45	45	45	45
N8													43	43	43	44	44	44	44	44	44	44	44	44
South Portion																								
S1	57	57	57	57	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
S2	56	56	56	56												46	46	46						
S3	54	54	54	54												44	44	44						
S4	54	54	54	54												44	44	44						
S5	50	50	50	50	50	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S6	47	47	47	47	47																			
S6	50	50	50	50	50	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S7	46	46	46	46	46																			
S7	49	49	49	49	49	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S8	45	45	45	45	45																			
S8	48	48	48	48	48	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
S9	45	45	45	45	45																			
S9	52	52	52	52															41	41	41			
S10	52	52	52	52														42	42	42	43	43	43	43
S11	51	51	51	51														41	41	41	42	42	42	42
S12	51	51	51	51														41	41	41				
Total SPL, dB(A)	68	68	67	67	64	63	63	63	62	62	62	62	62	62	62	63	63	63	63	61	61	60	60	60
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN10

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	65	65	64	64	64	64	64	64	64	64	64	65	65	65	65	65	64	64	64	64	64	64	64	64
N2	63	63	62	62	62	62	62	62	62	62	62	64	64	64	64	64	63	63	63	63	63	63	63	63
N3		66	66	66																				
N4																								58
N5	62	62	62	61	61	61	61	61	61	61	61	61	63	63	63	63	63	61	61	61	61	61	61	61
N6	61	61	61	59	59	59	59	59	59	59	59	59	61	61	61	61	61	60	60	60	60	60	60	60
N7	58	58																						
N8	56	56																						
South Portion																								
S1	56	56	56	55	55	55	55	55	55	55	55	57	57	57	57	56	56	56	56	56	56	56	56	56
S2	56	56	56									55	57											56
S3	54	54	54									53	55											53
S4	56	56	56										55	57										55
S5	55	55	55	54	54	54	54	54	54	55	55	55	55	55	55	54	54	54	54	54	54	54	54	50
S6	54	54	54	52	52	52	52	52	52	54	54	54	54	53	53	53	53	53	53	53	53	53	53	49
S7	54	54	54	52	52	52	52	52	52	54	54	54	54	54	54	53	53	53	53	53	53	53	53	49
S8	53	53	53	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
S9	52	52	52																					51
S10	53	53	53										50	52										53
S11	53	53	53																					52
S12	51	51	51																					51
Total SPL, dB(A)	71	72	71	70	68	68	68	68	68	69	69	70	72	73	72	72	71	69	69	69	69	69	69	70
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN10

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	54	54	55	55	55
N2	63	63	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	53	53	53
N3															55	55	55	55	56	56				
N4	58	58	58	58														48	48					
N5	61	61	61	61	58	58	58	58	54	54	54	54	54	54	54	54	54	54	54	54	54	51	51	51
N6	60	60	60	60	56	56	56	56	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	50
N7													47	47	47	48	48	48	48	48	48	48	48	48
N8													45	45	45	46	46	46	46	46	46	46	46	46
South Portion																								
S1	56	56	56	56	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S2		48	48	48																				
S3	56	56	56	56												46	46	46						
S4	53	53	53	53												43	43	43						
S5	55	55	55	55												45	45	45						
S5	50	50	50	50	50	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S6	47	47	47	47	47																			
S6	49	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S7	46	46	46	46	46																			
S7	49	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S8	46	46	46	46	46																			
S8	48	48	48	48	48	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	42
S9	45	45	45	45	45																			
S9	51	51	51	51															41	41	41			
S10	53	53	53	53															42	42	42	43	43	43
S11	52	52	52	52															42	42	42	43	43	43
S12	51	51	51	51															41	41	41			
Total SPL, dB(A)	69	69	68	68	64	64	64	64	62	62	62	62	62	62	63	63	63	63	63	63	61	60	60	60
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN11 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	57	57	56	56	56	56	56	56	56	56	56	58	58	58	58	58	57	57	57	57	57	57	57	57
N2	57	57	56	56	56	56	56	56	56	56	56	58	58	58	58	58	57	57	57	57	57	57	57	57
N3		62	62	62																				
N4																								56
N5	68	68	68	67	67	67	67	67	67	67	67	67	69	69	69	69	69	67	67	67	67	67	67	67
N6	61	61	61	59	59	59	59	59	59	59	59	59	61	61	61	61	61	60	60	60	60	60	60	60
N7	64	64																						
N8	59	59																						
South Portion																								
S1	54	54	54	52	52	52	52	52	52	52	52	54	54	54	54	53	53	53	53	53	53	53	53	53
S2	54	54	54									53	55											54
S3	52	52	52									50	52											51
S4	55	55	55										54	55										54
S5	54	54	54	52	52	52	52	52	52	54	54	54	54	53	53	53	53	53	53	53	53	53	53	49
S6	52	52	52	51	51	51	51	51	51	52	52	52	52	52	52	51	51	51	51	51	51	51	51	47
S7	53	53	53	52	52	52	52	52	52	54	54	54	54	53	53	53	53	53	53	53	53	53	53	44
S8	52	52	52	50	50	50	50	50	50	52	52	52	52	51	51	51	51	51	51	51	51	51	51	47
S9	50	50	50																					50
S10	54	54	54									49	51											54
S11	52	52	52										51	53										52
S12	51	51	51										49	51										50
Total SPL, dB(A)	71	72	71	69	68	68	68	68	68	69	69	69	71	73	73	73	72	69	69	69	69	69	69	70
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN11 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47	47	47
N2	57	57	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	48
N3															51	51	51	51	52	52				
N4	56	56	56	56														46	46					
N5	67	67	67	67	64	64	64	64	60	60	60	60	60	60	60	60	60	60	60	60	60	57	57	57
N6	60	60	60	60	56	56	56	56	53	53	53	53	53	53	53	53	53	53	53	53	53	50	50	50
N7													53	53	53	54	54	54	54	54	54	54	54	54
N8													48	48	48	49	49	49	49	49	49	49	49	49
South Portion																								
S1	53	53	53	53	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S2		45	45	45																				
S3	54	54	54	54												44	44	44						
S4	51	51	51	51												41	41	41						
S5	54	54	54	54												44	44	44						
S5	49	49	49	49	49	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S6	45	45	45	45	45																			
S6	47	47	47	47	47	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
S7	44	44	44	44	44																			
S7	49	49	49	49	49	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S8	45	45	45	45	45																			
S8	47	47	47	47	47	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	41	41	41
S9	44	44	44	44	44																			
S9	50	50	50	50															40	40	40			
S10	54	54	54	54												44	44	44	44	44	44	44	44	44
S11	52	52	52	52												42	42	42	43	43	43	43	43	43
S12	50	50	50	50															40	40	40			
Total SPL, dB(A)	70	70	70	70	66	66	66	66	62	62	62	62	62	63	63	63	63	63	63	63	63	61	61	61
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN12

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	55	55	53	53	53	53	53	53	53	53	53	55	55	55	55	55	54	54	54	54	54	54	54	54
N2	56	56	55	55	55	55	55	55	55	55	55	57	57	57	57	57	55	55	55	55	55	55	55	55
N3		58	58	58																				
N4																								56
N5	65	65	65	64	64	64	64	64	64	64	64	64	66	66	66	66	66	65	65	65	65	65	65	65
N6	62	62	62	60	60	60	60	60	60	60	60	60	62	62	62	62	62	61	61	61	61	61	61	61
N7	71	71																						
N8	62	62																						
South Portion																								
S1	53	53	53	52	52	52	52	52	52	52	52	54	54	54	54	53	53	53	53	53	53	53	53	53
S2	54	54	54								53	55												54
S3	52	52	52									50	52											51
S4	56	56	56										55	56										55
S5	54	54	54	52	52	52	52	52	52	54	54	54	54	54	54	53	53	53	53	53	53	53	53	49
																								46
S6	52	52	52	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
																								44
S7	54	54	54	53	53	53	53	53	53	55	55	55	55	54	54	53	53	53	53	53	53	53	53	50
																								46
S8	52	52	52	51	51	51	51	51	51	53	53	53	53	52	52	52	52	52	52	52	52	52	52	48
																								44
S9	51	51	51							49	51													50
S10	56	56	56								55	57												55
S11	54	54	54									52	54											53
S12	52	52	52										50	52										51
Total SPL, dB(A)	73	74	69	67	67	67	67	67	67	67	67	68	69	71	71	71	70	67	67	67	67	67	68	69
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN12

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	45	45	45
N2	55	55	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	45	45	46
N3															47	47	47	47	48	48				
N4	56	56	56	56														46	46					
N5	65	65	65	65	61	61	61	61	57	57	57	57	57	57	57	57	57	57	57	57	57	54	54	54
N6	61	61	61	61	57	57	57	57	53	53	53	53	53	53	53	53	53	53	53	53	53	51	51	51
N7													60	60	60	61	61	61	61	61	61	61	61	61
N8													51	51	51	52	52	52	52	52	52	52	52	52
South Portion																								
S1	53	53	53	53	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43
S2	54	54	54	54												44	44	44						
S3	51	51	51	51												41	41	41						
S4	55	55	55	55												45	45	45						
S5	49	49	49	49	49	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S6	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S7	50	50	50	50	50	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S8	48	48	48	48	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	42	42	42
S9	50	50	50	50																		40	40	40
S10	55	55	55	55																		46	46	46
S11	53	53	53	53																		44	44	44
S12	51	51	51	51																		41	41	41
Total SPL, dB(A)	68	68	69	69	65	64	64	64	60	60	63	63	63	64	64	64	64	64	64	64	64	63	63	63
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN13

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
North Portion																								
N1	53	53	52	52	52	52	52	52	52	52	52	53	53	53	53	53	52	52	52	52	52	52	52	52
N2	55	55	53	53	53	53	53	53	53	53	53	55	55	55	55	55	54	54	54	54	54	54	54	54
N3		55	55	55																				
N4																								57
N5	58	58	58	56	56	56	56	56	56	56	56	56	58	58	58	58	58	57	57	57	57	57	57	57
N6	59	59	59	58	58	58	58	58	58	58	58	58	60	60	60	60	60	59	59	59	59	59	59	59
N7	61	61																						
N8	66	66																						
South Portion																								
S1	54	54	54	52	52	52	52	52	52	52	52	54	54	54	54	53	53	53	53	53	53	53	53	53
S2	56	56	56								54	56												55
S3	53	53	53									52	54											53
S4	59	59	59										58	60										58
S5	56	56	56	55	55	55	55	55	55	57	57	57	57	56	56	56	56	56	56	56	56	56	56	52
																								48
S6	55	55	55	53	53	53	53	53	53	55	55	55	55	54	54	54	54	54	54	54	54	54	54	50
																								46
S7	58	58	58	56	56	56	56	56	56	58	58	58	58	57	57	57	57	57	57	57	57	57	57	53
																								49
S8	55	55	55	54	54	54	54	54	54	56	56	56	56	55	55	55	55	55	55	55	55	55	55	51
																								47
S9	53	53	53							51	53													52
S10	63	63	63								61	63												62
S11	59	59	59									58	59											58
S12	56	56	56										54	56										55
Total SPL, dB(A)	71	72	69	65	64	64	64	64	64	65	67	68	68	68	68	68	67	65	65	65	65	65	66	69
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.21 - Construction Noise Calculation (Mitigated)

NSR: CN13

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
North Portion																								
N1	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	42	42	43	43	43
N2	54	54	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	45
N3															45	45	45	45	46	46				
N4	57	57	57	57													47	47						
N5	57	57	57	57	53	53	53	53	50	50	50	50	50	50	50	50	50	50	50	50	50	47	47	47
N6	59	59	59	59	55	55	55	55	51	51	51	51	51	51	51	51	51	51	51	51	51	49	49	49
N7													50	50	50	51	51	51	51	51	51	51	51	51
N8													56	56	56	56	56	56	56	56	56	56	56	56
South Portion																								
S1	53	53	53	53	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	43	43	43
S2		46	46	46																				
S3	55	55	55	55												45	45	45						
S4	53	53	53	53												42	42	42						
S5	58	58	58	58												48	48	48						
S5	52	52	52	52	52	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	46	46	46
S6	48	48	48	48	48																			
S6	50	50	50	50	50	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	44	44	44
S7	46	46	46	46	46																			
S7	53	53	53	53	53	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	47	47	47
S8	49	49	49	49	49																			
S8	51	51	51	51	51	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	44	44	44
S9	47	47	47	47	47																			
S9	52	52	52	52															42	42	42			
S10	62	62	62	62															52	52	52	53	53	53
S11	58	58	58	58															48	48	48	49	49	49
S12	55	55	55	55															45	45	45			
Total SPL, dB(A)	69	69	69	69	62	60	60	60	58	58	60	60	60	61	61	62	62	62	62	62	62	61	61	61
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2J

**Construction Noise Level from the
Project (Mitigated)**

Appendix 5.2J - Construction Noise Level from the Project (Mitigated)

NSR	Noise Criteria, dB(A)	Max	SPL, dB(A)																							
			2017												2018											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24			
CN1	75	68	68	68	68	64	64	64	64	64	64	66	66	67	68	67	66	66	65	65	65	65	65	67		
CN2	75	70	70	70	69	66	66	66	66	66	66	67	68	69	70	69	69	68	67	67	67	67	67	69		
CN3	75	71	71	71	71	67	67	67	67	67	67	68	69	70	71	70	70	70	68	68	68	68	68	70		
CN4	75	67	67	67	66	64	63	63	63	63	63	64	65	66	67	67	67	67	65	64	64	64	64	66		
CN5	75	66	66	66	65	63	62	62	62	62	62	63	64	65	66	66	66	66	64	63	63	63	63	65		
CN6	75	65	65	65	64	61	60	60	60	60	60	61	62	63	64	64	64	63	61	61	61	61	61	63		
CN7	75	72	72	72	72	69	69	69	69	69	69	70	70	72	72	72	71	70	70	70	70	70	70	71		
CN8	75	68	67	67	67	65	64	64	64	64	64	65	65	67	68	68	68	68	66	65	65	65	65	66		
CN9	75	73	71	71	70	69	69	69	69	69	69	69	69	71	73	73	73	73	70	70	70	70	70	70		
CN10	75	73	71	72	71	70	68	68	68	68	68	69	69	70	72	73	72	72	71	69	69	69	69	70		
CN11	75	73	71	72	71	69	68	68	68	68	68	69	69	69	71	73	73	73	72	69	69	69	69	70		
CN12	75	74	73	74	69	67	67	67	67	67	67	67	67	68	69	71	71	71	70	67	67	67	67	69		
CN13	75	72	71	72	69	65	64	64	64	64	64	65	67	68	68	68	68	67	65	65	65	65	65	69		

NSR	Noise Criteria, dB(A)	Max	SPL, dB(A)																							
			2019												2020											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48			
CN1	75	68	67	67	67	67	61	58	58	58	57	57	57	57	57	57	57	59	59	59	59	58	58	55		
CN2	75	70	68	68	68	68	62	60	60	60	59	59	59	59	59	59	60	61	61	61	60	60	60	57		
CN3	75	71	69	70	69	69	63	61	61	61	60	60	61	61	61	61	61	62	62	62	61	61	61	59		
CN4	75	67	65	65	65	65	60	58	58	58	57	57	57	57	57	57	58	58	58	58	57	57	55			
CN5	75	66	64	64	63	63	58	57	57	57	56	56	56	56	56	56	57	57	57	57	56	56	54			
CN6	75	65	63	63	63	63	58	57	57	57	54	54	55	55	55	55	56	56	56	56	56	56	54			
CN7	75	72	71	71	70	70	64	63	63	63	62	62	62	62	62	62	62	63	63	63	63	62	60			
CN8	75	68	65	65	65	65	60	58	58	58	57	57	58	58	58	58	58	58	59	58	58	57	56			
CN9	75	73	68	68	67	67	64	63	63	63	62	62	62	62	62	62	63	63	63	63	63	61	60			
CN10	75	73	69	69	68	68	64	64	64	64	62	62	62	62	62	62	63	63	63	63	63	61	60			
CN11	75	73	70	70	70	70	66	66	66	66	62	62	62	62	62	63	63	63	63	63	63	63	61			
CN12	75	74	68	68	69	69	65	64	64	64	60	60	63	63	63	64	64	64	64	64	64	64	63			
CN13	75	72	69	69	69	69	62	60	60	60	58	58	60	60	60	61	61	62	62	62	62	62	61			

Appendix 5.2K

**SWL of Construction Activities from
Concurrent Projects**

Appendix 5.2K - SWL of Construction Activities from Concurrent Projects

Zone	SWL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	110	110	110	110	110	110																		
CKR S2							107	107	107	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
CKR S3a							106	106	106	106	106	106												
CKR S3b							106	106	106	106	106	106												
CKR S3c													108	108	108	108	108	108	108	111	111	111	111	111
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	107	107	107	107	107	107	107	107	107															
CKR S7	113	113	113	113	113	113																		
CKR S8	115	115	115	115	115	115																		
CKR S9							112	112																
CKR S10									111	111	111	111	111											
CKR S11												112	112	112	112	112	116	113	113	113	113	112		
CKR S12a																							112	112
CKR S12b																							112	112
CKR S13	107	107	107	108	108	108	108																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	106	106	106	106	106	106	106	106	106	106	106	106												
CKR S24	109	109	109	109	109	109	109	110	110	110	110	110	110	110	110	110	110	110	110					
CKR S32																							108	108
CKR S34							109	109	109	109	109	109	109	109	109	106	106	106	106	106	106	106	106	106
CKR S35							109	109	109	109	109	109	109	109	109	106	106	106	106	106	106	106	106	106
SCL TKW S1	109	110	110	110	109	108	108	108	108	108	108	108	108	106	106	106	106	106	106	106	104	104	104	104
SCL TKW S8	108	108	108																					
SCL TKW S9	108	108	108																					
SCL TKW S10	108	108	108																					
SCL TKW S11	108	108	108																					
SCL TKW S13	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104									
KTD 226	113	113	113	113	113	113	113	113	113	113	113	113												
KTD 227	113	113	113	113	113	113	113	113	113	113	113	113												
KTD 403	113	113	113	113																				
KTD 405					109	109	109	109	109	109	109	109	109	109	109	109								
KTD 621	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
KTD 628							112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112
KTD 629																				106	106	106	106	106
KTD 630	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106
KTD 631	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106
KTD 632	110	110	110	110	110	110	110	110	110	110	110	110												
KTD 633	110	110	110	110	110	110	110	110	110	110	110	110												
KTD 634	110	110	110	110	110	110	110	110	110	110	110	110												
KTD 635	113	113	113	113	113	113																		
KTD 636	113	113	113	113	113	113																		

Remark:

The work sites which are more than 300m from the NSRs will not be listed above.
 The work sites which are completed before 2017 or conducted after 2020 will not be listed above.
 The SWLs are referred to the mitigated plant list from the corresponding approved EIA.
 Based on the updated information, the programme of CKR will be delayed by two years.
 Based on the updated information, the programme of SCL will be delayed by two years.
 Based on the updated information, the programme of KTD will be delayed site by site. Most of the sites are delayed by two years.

Appendix 5.2K - SWL of Construction Activities from Concurrent Projects

Zone	SWL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
CKR S3a																								
CKR S3b																								
CKR S3c	111	111	108	108	108																			
CKR S4a						106	106	106	106															
CKR S4b						106	106	106	106															
CKR S4c										108	108	108	108	108	111	111	111	111	113	108				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	114	114																						
CKR S14b	114	114																						
CKR S15a			112	112	112	112	112																	
CKR S15b			112	112	112	112	112																	
CKR S16			112	112	112	112	112																	
CKR S17			113	113	113	113	113																	
CKR S18								112	112	112														
CKR S19a											109	109	109	109	109	109								
CKR S19b											109	109	109	109	109	109								
CKR S20															112	112	112	112	112	116	113	113	113	113
CKR S22																								
CKR S24																								
CKR S32	108	107	107	107	107	107	107	108																
CKR S34	106	106	106	106	106	106	106	106	106	106	106													
CKR S35	106	106	106	106	106	106	106	106	106	106	106													
SCL TKW S1	104	104	104	104	104	104																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								

Remark:

The work sites which are more than 300m from the NSRs will not be listed above.
 The work sites which are completed before 2017 or conducted after 2020 will not be listed above.
 The SWLs are referred to the mitigated plant list from the corresponding approved EIA.
 Based on the updated information, the programme of CKR will be delayed by two years.
 Based on the updated information, the programme of SCL will be delayed by two years.
 Based on the updated information, the programme of KTD will be delayed site by site. Most of the sites are delayed by two years.

Appendix 5.2L

**Notional Distance, Correction and
Screening of NSRs for Concurrent
Projects**

Table 1 - Notional Distance from Construction Zones to NSRs, m

Zone	NSR												
	CN1	CN2	CN3	CN4	CN5	CN6	CN7	CN8	CN9	CN10	CN11	CN12	CN13
CKR S1	235	372	402	468	648	1362	480	582	768	876	1080	1122	1026
CKR S2	224	288	318	396	588	1278	396	516	690	792	996	1032	960
CKR S3a	172	270	318	396	588	1278	396	516	690	792	996	1032	960
CKR S3b	220	288	318	396	588	1278	396	516	690	792	996	1032	960
CKR S3c	191	288	318	396	588	1278	396	516	690	792	996	1032	960
CKR S4a	134	292	318	396	588	1278	396	516	690	792	996	1032	960
CKR S4b	169	288	318	396	588	1278	396	516	690	792	996	1032	960
CKR S4c	185	288	318	396	588	1278	396	516	690	792	996	1032	960
CKR S6	295	456	492	558	744	1422	558	678	852	960	1158	1182	1086
CKR S7	244	360	378	546	744	1074	426	648	720	780	906	894	714
CKR S8	254	360	378	546	744	1074	426	648	720	780	906	894	714
CKR S9	254	360	378	546	744	1074	426	648	720	780	906	894	714
CKR S10	254	360	378	546	744	1074	426	648	720	780	906	894	714
CKR S11	264	360	378	546	744	1074	426	648	720	780	906	894	714
CKR S12a	244	360	378	546	744	1074	426	648	720	780	906	894	714
CKR S12b	285	360	378	546	744	1074	426	648	720	780	906	894	714
CKR S13	138	312	342	450	642	1266	414	564	720	810	1002	1032	936
CKR S14a	209	324	348	498	696	1110	408	606	720	792	948	912	738
CKR S14b	295	324	348	498	696	1110	408	606	720	792	948	912	738
CKR S15a	119	295	348	498	696	1110	408	606	720	792	948	912	738
CKR S15b	197	324	348	498	696	1110	408	606	720	792	948	912	738
CKR S16	119	295	348	498	696	1110	408	606	720	792	948	912	738
CKR S17	197	324	348	498	696	1110	408	606	720	792	948	912	738
CKR S18	160	324	348	498	696	1110	408	606	720	792	948	912	738
CKR S19a	130	318	342	480	678	1218	414	588	720	804	978	990	876
CKR S19b	179	318	342	480	678	1218	414	588	720	804	978	990	876
CKR S20	155	318	342	480	678	1218	414	588	720	804	978	990	876
CKR S22	288	390	384	582	750	1014	414	654	696	726	840	810	642
CKR S24	295	408	402	606	774	1014	438	672	714	738	792	816	642
CKR S32	612	642	612	804	918	618	594	816	744	696	672	558	279
CKR S34	678	678	642	822	918	606	618	822	726	654	612	492	228
CKR S35	738	744	714	894	996	630	690	900	804	732	672	546	264
SCL TKW S1	738	540	516	414	249	792	456	289	166	203	396	558	750
SCL TKW S8	738	552	546	372	183	1068	504	281	324	438	666	828	984
SCL TKW S9	702	522	516	336	158	1104	492	249	342	468	702	858	1002
SCL TKW S10	696	516	510	330	155	1110	486	242	348	474	714	864	1002
SCL TKW S11	690	510	504	318	157	1128	480	242	354	486	732	882	1014
SCL TKW S13	738	540	516	414	249	792	456	289	166	203	396	558	750
KTD 226	1362	1242	1194	1248	1182	268	1122	1152	924	780	534	468	660
KTD 227	1158	1068	1026	1128	1110	70	966	1056	846	708	468	342	360
KTD 403	960	918	876	1026	1068	250	834	990	828	714	558	384	170
KTD 405	852	834	804	966	1038	480	762	942	816	720	600	450	180
KTD 621	690	654	606	768	840	468	570	750	624	546	288	135	57
KTD 628	390	190	175	121	203	936	136	105	224	342	582	678	732
KTD 629	390	190	175	121	203	936	136	105	224	342	582	678	732
KTD 630	768	708	678	822	858	390	624	786	630	528	414	290	25
KTD 631	182	53	40	233	408	972	105	312	402	480	678	720	678
KTD 632	690	654	606	768	840	468	570	750	624	546	288	135	57
KTD 633	864	672	648	528	360	876	588	408	295	318	486	654	870
KTD 634	864	672	648	528	360	876	588	408	295	318	486	654	870
KTD 635	408	139	103	126	83	936	31	28	172	336	576	678	738
KTD 636	408	139	103	126	83	936	31	28	172	336	576	678	738

Table 2 - Distance Attenuation and Façade Correction, dB(A)

Zone	NSR												
	CN1	CN2	CN3	CN4	CN5	CN6	CN7	CN8	CN9	CN10	CN11	CN12	CN13
CKR S1	-52	-56	-57	-58	-61	-68	-59	-60	-63	-64	-66	-66	-65
CKR S2	-52	-54	-55	-57	-60	-67	-57	-59	-62	-63	-65	-65	-65
CKR S3a	-50	-54	-55	-57	-60	-67	-57	-59	-62	-63	-65	-65	-65
CKR S3b	-52	-54	-55	-57	-60	-67	-57	-59	-62	-63	-65	-65	-65
CKR S3c	-51	-54	-55	-57	-60	-67	-57	-59	-62	-63	-65	-65	-65
CKR S4a	-48	-54	-55	-57	-60	-67	-57	-59	-62	-63	-65	-65	-65
CKR S4b	-50	-54	-55	-57	-60	-67	-57	-59	-62	-63	-65	-65	-65
CKR S4c	-50	-54	-55	-57	-60	-67	-57	-59	-62	-63	-65	-65	-65
CKR S6	-54	-58	-59	-60	-62	-68	-60	-62	-64	-65	-66	-66	-66
CKR S7	-53	-56	-57	-60	-62	-66	-58	-61	-62	-63	-64	-64	-62
CKR S8	-53	-56	-57	-60	-62	-66	-58	-61	-62	-63	-64	-64	-62
CKR S9	-53	-56	-57	-60	-62	-66	-58	-61	-62	-63	-64	-64	-62
CKR S10	-53	-56	-57	-60	-62	-66	-58	-61	-62	-63	-64	-64	-62
CKR S11	-53	-56	-57	-60	-62	-66	-58	-61	-62	-63	-64	-64	-62
CKR S12a	-53	-56	-57	-60	-62	-66	-58	-61	-62	-63	-64	-64	-62
CKR S12b	-54	-56	-57	-60	-62	-66	-58	-61	-62	-63	-64	-64	-62
CKR S13	-48	-55	-56	-58	-61	-67	-57	-60	-62	-63	-65	-65	-64
CKR S14a	-51	-55	-56	-59	-62	-66	-57	-61	-62	-63	-65	-64	-62
CKR S14b	-54	-55	-56	-59	-62	-66	-57	-61	-62	-63	-65	-64	-62
CKR S15a	-46	-54	-56	-59	-62	-66	-57	-61	-62	-63	-65	-64	-62
CKR S15b	-51	-55	-56	-59	-62	-66	-57	-61	-62	-63	-65	-64	-62
CKR S16	-46	-54	-56	-59	-62	-66	-57	-61	-62	-63	-65	-64	-62
CKR S17	-51	-55	-56	-59	-62	-66	-57	-61	-62	-63	-65	-64	-62
CKR S18	-49	-55	-56	-59	-62	-66	-57	-61	-62	-63	-65	-64	-62
CKR S19a	-47	-55	-56	-59	-62	-67	-57	-60	-62	-63	-65	-65	-64
CKR S19b	-50	-55	-56	-59	-62	-67	-57	-60	-62	-63	-65	-65	-64
CKR S20	-49	-55	-56	-59	-62	-67	-57	-60	-62	-63	-65	-65	-64
CKR S22	-54	-57	-57	-60	-62	-65	-57	-61	-62	-62	-63	-63	-61
CKR S24	-54	-57	-57	-61	-63	-65	-58	-62	-62	-62	-63	-63	-61
CKR S32	-61	-61	-61	-63	-64	-61	-60	-63	-62	-62	-62	-60	-54
CKR S34	-62	-62	-61	-63	-64	-61	-61	-63	-62	-61	-61	-59	-52
CKR S35	-62	-62	-62	-64	-65	-61	-62	-64	-63	-62	-62	-60	-53
SCL TKW S1	-62	-60	-59	-57	-53	-63	-58	-54	-49	-51	-57	-60	-62
SCL TKW S8	-62	-60	-60	-56	-50	-66	-59	-54	-55	-58	-61	-63	-65
SCL TKW S9	-62	-59	-59	-56	-49	-66	-59	-53	-56	-58	-62	-64	-65
SCL TKW S10	-62	-59	-59	-55	-49	-66	-59	-53	-56	-58	-62	-64	-65
SCL TKW S11	-62	-59	-59	-55	-49	-66	-59	-53	-56	-59	-62	-64	-65
SCL TKW S13	-62	-60	-59	-57	-53	-63	-58	-54	-49	-51	-57	-60	-62
KTD 226	-68	-67	-67	-67	-66	-54	-66	-66	-64	-63	-60	-58	-61
KTD 227	-66	-66	-65	-66	-66	-42	-65	-65	-64	-62	-58	-56	-56
KTD 403	-65	-64	-64	-65	-66	-53	-63	-65	-63	-62	-60	-57	-50
KTD 405	-64	-63	-63	-65	-65	-59	-63	-64	-63	-62	-61	-58	-50
KTD 621	-62	-61	-61	-63	-63	-58	-60	-62	-61	-60	-54	-48	-40
KTD 628	-57	-51	-50	-47	-51	-64	-48	-45	-52	-56	-60	-62	-62
KTD 629	-57	-51	-50	-47	-51	-64	-48	-45	-52	-56	-60	-62	-62
KTD 630	-63	-62	-62	-63	-64	-57	-61	-63	-61	-59	-57	-54	-33
KTD 631	-50	-39	-37	-52	-57	-65	-45	-55	-57	-59	-62	-62	-62
KTD 632	-62	-61	-61	-63	-63	-58	-60	-62	-61	-60	-54	-48	-40
KTD 633	-64	-62	-61	-59	-56	-64	-60	-57	-54	-55	-59	-61	-64
KTD 634	-64	-62	-61	-59	-56	-64	-60	-57	-54	-55	-59	-61	-64
KTD 635	-57	-48	-45	-47	-43	-64	-35	-34	-50	-56	-60	-62	-62
KTD 636	-57	-48	-45	-47	-43	-64	-35	-34	-50	-56	-60	-62	-62

Table 3 - Screening Between Construction Zones and NSRs, dB(A)

Zone	NSR												
	CN1	CN2	CN3	CN4	CN5	CN6	CN7	CN8	CN9	CN10	CN11	CN12	CN13
CKR S1	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S2	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S3a	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S3b	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S3c	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S4a	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S4b	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S4c	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S6	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S7	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S8	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S9	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S10	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S11	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S12a	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S12b	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S13	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S14a	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S14b	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S15a	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S15b	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S16	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S17	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S18	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S19a	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S19b	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S20	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
CKR S22	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S24	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S32	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S34	0	0	0	0	0	0	0	0	0	0	0	0	0
CKR S35	0	0	0	0	0	0	0	0	0	0	0	0	0
SCL TKW S1	0	0	0	0	0	0	0	0	0	0	0	0	0
SCL TKW S8	0	0	0	0	0	0	0	0	0	0	0	0	0
SCL TKW S9	0	0	0	0	0	0	0	0	0	0	0	0	0
SCL TKW S10	0	0	0	0	0	0	0	0	0	0	0	0	0
SCL TKW S11	0	0	0	0	0	0	0	0	0	0	0	0	0
SCL TKW S13	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 226	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 227	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 403	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 405	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 621	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 628	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 629	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 630	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 631	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 632	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 633	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 634	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 635	0	0	0	0	0	0	0	0	0	0	0	0	0
KTD 636	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix 5.2M

**Construction Noise Calculation for
Concurrent Projects**

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN1 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	48	48	48	48	48	48																		
CKR S2							45	45	45	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
CKR S3a							46	46	46	46	46	46												
CKR S3b							44	44	44	44	44	44												
CKR S3c													47	47	47	47	47	47	47	50	50	50	50	50
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	43	43	43	43	43	43	43	43	43															
CKR S7	60	60	60	60	60	60																		
CKR S8	62	62	62	62	62	62																		
CKR S9							59	59																
CKR S10									58	58	58	58	58											
CKR S11												59	59	59	59	59	63	60	60	60	60	59		
CKR S12a																							59	59
CKR S12b																							58	58
CKR S13	49	49	49	50	50	50	50																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	52	52	52	52	52	52	52	52	52	52	52	52												
CKR S24	55	55	55	55	55	55	55	56	56	56	56	56	56	56	56	56	56	56	56					
CKR S32																							47	47
CKR S34						47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44
CKR S35						47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44
SCL TKW S1	47	48	48	48	47	46	46	46	46	46	46	46	46	44	44	44	44	44	44	44	44	42	42	42
SCL TKW S8	46	46	46																					
SCL TKW S9	46	46	46																					
SCL TKW S10	46	46	46																					
SCL TKW S11	46	46	46																					
SCL TKW S13	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42									
KTD 226	45	45	45	45	45	45	45	45	45	45	45	45												
KTD 227	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 403	48	48	48	48																				
KTD 405					45	45	45	45	45	45	45	45	45	45	45	45								
KTD 621	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
KTD 628							55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
KTD 629																			49	49	49	49	49	49
KTD 630	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
KTD 631	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56
KTD 632	48	48	48	48	48	48	48	48	48	48	48	48												
KTD 633	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 634	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 635	56	56	56	56	56	56																		
KTD 636	56	56	56	56	56	56																		
Total SPL, dB(A)	67	67	67	67	67	67	64	64	64	64	64	65	65	64	64	63	65	64	64	63	63	63	64	64
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN1 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
CKR S3a																								
CKR S3b																								
CKR S3c	50	50	47	47	47																			
CKR S4a						48	48	48	48															
CKR S4b						46	46	46	46															
CKR S4c										48	48	48	48	48	51	51	51	51	53	48				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	63	63																						
CKR S14b	60	60																						
CKR S15a			56	56	56	56	56																	
CKR S15b			51	51	51	51	51																	
CKR S16			56	56	56	56	56																	
CKR S17			52	52	52	52	52																	
CKR S18								53	53	53														
CKR S19a											52	52	52	52	52	52								
CKR S19b											49	49	49	49	49	49								
CKR S20															53	53	53	53	53	57	54	54	54	54
CKR S22																								
CKR S24																								
CKR S32	47	46	46	46	46	46	46	47																
CKR S34	44	44	44	44	44	44	44	44	44	44	44													
CKR S35	44	44	44	44	44	44	44	44	44	44	44													
SCL TKW S1	42	42	42	42	42	42																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	65	65	61	61	61	61	61	57	56	56	56	55	55	55	58	58	56	56	57	58	55	55	55	55
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN2 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	44	44	44	44	44	44																		
CKR S2							43	43	43	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
CKR S3a							42	42	42	42	42	42												
CKR S3b							42	42	42	42	42	42												
CKR S3c													44	44	44	44	44	44	44	47	47	47	47	47
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	39	39	39	39	39	39	39	39	39															
CKR S7	57	57	57	57	57	57																		
CKR S8	59	59	59	59	59	59																		
CKR S9							56	56																
CKR S10									55	55	55	55	55											
CKR S11												56	56	56	56	56	60	57	57	57	57	56		
CKR S12a																						56	56	
CKR S12b																						56	56	
CKR S13	42	42	42	43	43	43	43																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	49	49	49	49	49	49	49	49	49	49	49	49												
CKR S24	52	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	53	53						
CKR S32																						47	47	
CKR S34						47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44
CKR S35						47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44	44
SCL TKW S1	49	50	50	50	49	48	48	48	48	48	48	48	48	46	46	46	46	46	46	46	44	44	44	44
SCL TKW S8	48	48	48																					
SCL TKW S9	49	49	49																					
SCL TKW S10	49	49	49																					
SCL TKW S11	49	49	49																					
SCL TKW S13	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44									
KTD 226	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 227	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 403	49	49	49	49																				
KTD 405					46	46	46	46	46	46	46	46	46	46	46	46								
KTD 621	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
KTD 628							61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61
KTD 629																			55	55	55	55	55	55
KTD 630	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
KTD 631	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
KTD 632	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 633	48	48	48	48	48	48	48	48	48	48	48	48												
KTD 634	48	48	48	48	48	48	48	48	48	48	48	48												
KTD 635	65	65	65	65	65	65																		
KTD 636	65	65	65	65	65	65																		
Total SPL, dB(A)	71	71	71	71	71	71	69	69	69	69	69	69	69	68	68	68	69	68	69	69	68	68	69	69
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN2 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
CKR S3a																								
CKR S3b																								
CKR S3c	47	47	44	44	44																			
CKR S4a						42	42	42	42															
CKR S4b						42	42	42	42															
CKR S4c										44	44	44	44	44	47	47	47	47	49	44				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	59	59																						
CKR S14b	59	59																						
CKR S15a			48	48	48	48	48																	
CKR S15b			47	47	47	47	47																	
CKR S16			48	48	48	48	48																	
CKR S17			48	48	48	48	48																	
CKR S18								47	47	47														
CKR S19a											44	44	44	44	44	44								
CKR S19b											44	44	44	44	44	44								
CKR S20															47	47	47	47	47	51	48	48	48	48
CKR S22																								
CKR S24																								
CKR S32	47	46	46	46	46	46	46	47																
CKR S34	44	44	44	44	44	44	44	44	44	44	44													
CKR S35	44	44	44	44	44	44	44	44	44	44	44													
SCL TKW S1	44	44	44	44	44	44																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	62	62	56	56	56	56	56	53	52	52	52	51	51	51	53	53	51	51	52	53	50	50	50	50
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN3 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	43	43	43	43	43	43																		
CKR S2							42	42	42	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
CKR S3a							41	41	41	41	41	41												
CKR S3b							41	41	41	41	41	41												
CKR S3c													43	43	43	43	43	43	43	46	46	46	46	46
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	38	38	38	38	38	38	38	38	38															
CKR S7	56	56	56	56	56	56																		
CKR S8	58	58	58	58	58	58																		
CKR S9							55	55																
CKR S10									54	54	54	54	54											
CKR S11												55	55	55	55	55	59	56	56	56	56	55		
CKR S12a																							55	55
CKR S12b																							55	55
CKR S13	41	41	41	42	42	42	42																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	49	49	49	49	49	49	49	49	49	49	49	49												
CKR S24	52	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	53	53						
CKR S32																							47	47
CKR S34						48	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45
CKR S35						47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44
SCL TKW S1	50	51	51	51	50	49	49	49	49	49	49	49	49	47	47	47	47	47	47	47	45	45	45	45
SCL TKW S8	48	48	48																					
SCL TKW S9	49	49	49																					
SCL TKW S10	49	49	49																					
SCL TKW S11	49	49	49																					
SCL TKW S13	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45									
KTD 226	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 227	48	48	48	48	48	48	48	48	48	48	48	48												
KTD 403	49	49	49	49																				
KTD 405					46	46	46	46	46	46	46	46	46	46	46	46								
KTD 621	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
KTD 628							62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
KTD 629																			56	56	56	56	56	56
KTD 630	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
KTD 631	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
KTD 632	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 633	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 634	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 635	68	68	68	68	68	68																		
KTD 636	68	68	68	68	68	68																		
Total SPL, dB(A)	73	73	73	73	73	73	70	70	70	70	70	71	70	70	70	70	70	70	70	70	70	70	70	70
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN3

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
CKR S3a																								
CKR S3b																								
CKR S3c	46	46	43	43	43																			
CKR S4a						41	41	41	41															
CKR S4b						41	41	41	41															
CKR S4c										43	43	43	43	43	46	46	46	46	48	43				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	58	58																						
CKR S14b	58	58																						
CKR S15a			46	46	46	46	46																	
CKR S15b			46	46	46	46	46																	
CKR S16			46	46	46	46	46																	
CKR S17			47	47	47	47	47																	
CKR S18								46	46	46														
CKR S19a											43	43	43	43	43	43								
CKR S19b											43	43	43	43	43	43								
CKR S20															46	46	46	46	46	50	47	47	47	47
CKR S22																								
CKR S24																								
CKR S32	47	46	46	46	46	46	46	47																
CKR S34	45	45	45	45	45	45	45	45	45	45	45													
CKR S35	44	44	44	44	44	44	44	44	44	44	44													
SCL TKW S1	45	45	45	45	45	45																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	62	62	56	56	56	56	55	53	52	52	52	50	50	50	52	52	51	51	51	52	49	49	49	49
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN4 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	42	42	42	42	42	42																		
CKR S2							40	40	40	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
CKR S3a							39	39	39	39	39	39												
CKR S3b							39	39	39	39	39	39												
CKR S3c													41	41	41	41	41	41	41	44	44	44	44	44
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	37	37	37	37	37	37	37	37	37															
CKR S7	53	53	53	53	53	53																		
CKR S8	55	55	55	55	55	55																		
CKR S9							52	52																
CKR S10									51	51	51	51	51											
CKR S11												52	52	52	52	52	56	53	53	53	53	52		
CKR S12a																							52	52
CKR S12b																							52	52
CKR S13	39	39	39	40	40	40	40																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	46	46	46	46	46	46	46	46	46	46	46	46												
CKR S24	48	48	48	48	48	48	48	49	49	49	49	49	49	49	49	49	49	49	49					
CKR S32																							45	45
CKR S34						46	46	46	46	46	46	46	46	46	46	43	43	43	43	43	43	43	43	43
CKR S35						45	45	45	45	45	45	45	45	45	45	42	42	42	42	42	42	42	42	42
SCL TKW S1	52	53	53	53	52	51	51	51	51	51	51	51	51	49	49	49	49	49	49	49	47	47	47	47
SCL TKW S8	52	52	52																					
SCL TKW S9	52	52	52																					
SCL TKW S10	53	53	53																					
SCL TKW S11	53	53	53																					
SCL TKW S13	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47									
KTD 226	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 227	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 403	48	48	48	48																				
KTD 405					44	44	44	44	44	44	44	44	44	44	44	44								
KTD 621	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
KTD 628							65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
KTD 629																			59	59	59	59	59	59
KTD 630	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
KTD 631	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
KTD 632	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 633	51	51	51	51	51	51	51	51	51	51	51	51												
KTD 634	51	51	51	51	51	51	51	51	51	51	51	51												
KTD 635	66	66	66	66	66	66																		
KTD 636	66	66	66	66	66	66																		
Total SPL, dB(A)	70	70	70	70	70	70	67	67	67	67	67	67	67	66	66	66	66	66	67	67	67	67	67	67
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN4 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
CKR S3a																								
CKR S3b																								
CKR S3c	44	44	41	41	41																			
CKR S4a						39	39	39	39															
CKR S4b						39	39	39	39															
CKR S4c										41	41	41	41	41	44	44	44	44	46	41				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	55	55																						
CKR S14b	55	55																						
CKR S15a			43	43	43	43	43																	
CKR S15b			43	43	43	43	43																	
CKR S16			43	43	43	43	43																	
CKR S17			44	44	44	44	44																	
CKR S18								43	43	43														
CKR S19a											40	40	40	40	40	40								
CKR S19b											40	40	40	40	40	40								
CKR S20															43	43	43	43	43	47	44	44	44	44
CKR S22																								
CKR S24																								
CKR S32	45	44	44	44	44	44	44	45																
CKR S34	43	43	43	43	43	43	43	43	43	43	43													
CKR S35	42	42	42	42	42	42	42	42	42	42	42													
SCL TKW S1	47	47	47	47	47	47																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	59	59	54	54	54	54	53	51	50	49	50	47	47	47	50	50	48	48	49	49	47	47	47	47
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN5 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	39	39	39	39	39	39																		
CKR S2							37	37	37	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
CKR S3a							36	36	36	36	36	36												
CKR S3b							36	36	36	36	36	36												
CKR S3c													38	38	38	38	38	38	38	41	41	41	41	41
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	35	35	35	35	35	35	35	35	35															
CKR S7	51	51	51	51	51	51																		
CKR S8	53	53	53	53	53	53																		
CKR S9							50	50																
CKR S10									49	49	49	49	49											
CKR S11												50	50	50	50	50	54	51	51	51	51	50		
CKR S12a																							50	50
CKR S12b																							50	50
CKR S13	36	36	36	37	37	37	37																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	44	44	44	44	44	44	44	44	44	44	44	44												
CKR S24	46	46	46	46	46	46	46	47	47	47	47	47	47	47	47	47	47	47						
CKR S32																							44	44
CKR S34						45	45	45	45	45	45	45	45	45	45	42	42	42	42	42	42	42	42	42
CKR S35						44	44	44	44	44	44	44	44	44	44	41	41	41	41	41	41	41	41	41
SCL TKW S1	56	57	57	57	56	55	55	55	55	55	55	55	55	53	53	53	53	53	53	53	51	51	51	51
SCL TKW S8	58	58	58																					
SCL TKW S9	59	59	59																					
SCL TKW S10	59	59	59																					
SCL TKW S11	59	59	59																					
SCL TKW S13	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51									
KTD 226	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 227	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 403	47	47	47	47																				
KTD 405					44	44	44	44	44	44	44	44	44	44	44	44								
KTD 621	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
KTD 628							61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61
KTD 629																			55	55	55	55	55	55
KTD 630	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
KTD 631	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
KTD 632	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 633	54	54	54	54	54	54	54	54	54	54	54	54												
KTD 634	54	54	54	54	54	54	54	54	54	54	54	54												
KTD 635	70	70	70	70	70	70																		
KTD 636	70	70	70	70	70	70																		
Total SPL, dB(A)	74	74	74	73	73	73	64	64	64	64	64	65	63	63	63	63	63	63	63	63	63	63	63	63
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN5 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
CKR S3a																								
CKR S3b																								
CKR S3c	41	41	38	38	38																			
CKR S4a						36	36	36	36															
CKR S4b						36	36	36	36															
CKR S4c										38	38	38	38	38	41	41	41	41	43	38				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	52	52																						
CKR S14b	52	52																						
CKR S15a			40	40	40	40	40																	
CKR S15b			40	40	40	40	40																	
CKR S16			40	40	40	40	40																	
CKR S17			41	41	41	41	41																	
CKR S18								40	40	40														
CKR S19a											37	37	37	37	37	37								
CKR S19b											37	37	37	37	37	37								
CKR S20															40	40	40	40	40	44	41	41	41	41
CKR S22																								
CKR S24																								
CKR S32	44	43	43	43	43	43	43	44																
CKR S34	42	42	42	42	42	42	42	42	42	42	42													
CKR S35	41	41	41	41	41	41	41	41	41	41	41													
SCL TKW S1	51	51	51	51	51	51																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	57	57	54	54	54	54	50	49	47	47	47	44	44	44	46	46	45	45	46	46	44	44	44	44
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN6 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	32	32	32	32	32	32																		
CKR S2							30	30	30	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
CKR S3a							29	29	29	29	29	29												
CKR S3b							29	29	29	29	29	29												
CKR S3c													31	31	31	31	31	31	31	34	34	34	34	34
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	29	29	29	29	29	29	29	29	29															
CKR S7	47	47	47	47	47	47																		
CKR S8	49	49	49	49	49	49																		
CKR S9							46	46																
CKR S10									45	45	45	45	45											
CKR S11												46	46	46	46	46	50	47	47	47	47	46		
CKR S12a																							46	46
CKR S12b																							46	46
CKR S13	30	30	30	31	31	31	31																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	41	41	41	41	41	41	41	41	41	41	41	41												
CKR S24	44	44	44	44	44	44	44	45	45	45	45	45	45	45	45	45	45	45	45					
CKR S32																							47	47
CKR S34						48	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45
CKR S35						48	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45
SCL TKW S1	46	47	47	47	46	45	45	45	45	45	45	45	45	43	43	43	43	43	43	43	41	41	41	41
SCL TKW S8	42	42	42																					
SCL TKW S9	42	42	42																					
SCL TKW S10	42	42	42																					
SCL TKW S11	42	42	42																					
SCL TKW S13	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41									
KTD 226	59	59	59	59	59	59	59	59	59	59	59	59												
KTD 227	71	71	71	71	71	71	71	71	71	71	71	71												
KTD 403	60	60	60	60																				
KTD 405					50	50	50	50	50	50	50	50	50	50	50									
KTD 621	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
KTD 628							48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
KTD 629																			42	42	42	42	42	42
KTD 630	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
KTD 631	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
KTD 632	52	52	52	52	52	52	52	52	52	52	52	52												
KTD 633	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 634	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 635	49	49	49	49	49	49																		
KTD 636	49	49	49	49	49	49																		
Total SPL, dB(A)	72	72	72	72	72	72	72	72	72	72	72	72	59	59	59	59	58	58	58	58	58	58	58	58
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN6 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
CKR S3a																								
CKR S3b																								
CKR S3c	34	34	31	31	31																			
CKR S4a						29	29	29	29															
CKR S4b						29	29	29	29															
CKR S4c										31	31	31	31	31	34	34	34	34	36	31				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	48	48																						
CKR S14b	48	48																						
CKR S15a			36	36	36	36	36																	
CKR S15b			36	36	36	36	36																	
CKR S16			36	36	36	36	36																	
CKR S17			37	37	37	37	37																	
CKR S18								36	36	36														
CKR S19a											32	32	32	32	32	32								
CKR S19b											32	32	32	32	32	32								
CKR S20															35	35	35	35	35	39	36	36	36	36
CKR S22																								
CKR S24																								
CKR S32	47	46	46	46	46	46	46	47																
CKR S34	45	45	45	45	45	45	45	45	45	45	45													
CKR S35	45	45	45	45	45	45	45	45	45	45	45													
SCL TKW S1	41	41	41	41	41	41																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	54	54	51	51	51	52	51	51	49	49	49	38	38	38	40	40	39	39	40	41	38	38	38	38
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN7 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	41	41	41	41	41	41																		
CKR S2							40	40	40	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
CKR S3a							39	39	39	39	39	39												
CKR S3b							39	39	39	39	39	39												
CKR S3c													41	41	41	41	41	41	41	44	44	44	44	44
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	37	37	37	37	37	37	37	37	37															
CKR S7	55	55	55	55	55	55																		
CKR S8	57	57	57	57	57	57																		
CKR S9							54	54																
CKR S10									53	53	53	53	53											
CKR S11												54	54	54	54	54	58	55	55	55	55	54		
CKR S12a																							54	54
CKR S12b																							54	54
CKR S13	40	40	40	41	41	41	41																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	49	49	49	49	49	49	49	49	49	49	49	49												
CKR S24	51	51	51	51	51	51	51	52	52	52	52	52	52	52	52	52	52	52						
CKR S32																							48	48
CKR S34						48	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45
CKR S35						47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44
SCL TKW S1	51	52	52	52	51	50	50	50	50	50	50	50	50	48	48	48	48	48	48	48	46	46	46	46
SCL TKW S8	49	49	49																					
SCL TKW S9	49	49	49																					
SCL TKW S10	49	49	49																					
SCL TKW S11	49	49	49																					
SCL TKW S13	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46									
KTD 226	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 227	48	48	48	48	48	48	48	48	48	48	48	48												
KTD 403	50	50	50	50																				
KTD 405					46	46	46	46	46	46	46	46	46	46	46	46								
KTD 621	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
KTD 628							64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
KTD 629																			58	58	58	58	58	58
KTD 630	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
KTD 631	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61
KTD 632	50	50	50	50	50	50	50	50	50	50	50	50												
KTD 633	50	50	50	50	50	50	50	50	50	50	50	50												
KTD 634	50	50	50	50	50	50	50	50	50	50	50	50												
KTD 635	78	78	78	78	78	78																		
KTD 636	78	78	78	78	78	78																		
Total SPL, dB(A)	81	81	81	81	81	81	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
Exceedance	6	6	6	6	6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN7

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
CKR S3a																								
CKR S3b																								
CKR S3c	44	44	41	41	41																			
CKR S4a							39	39	39	39														
CKR S4b							39	39	39	39														
CKR S4c										41	41	41	41	41	44	44	44	44	46	41				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	57	57																						
CKR S14b	57	57																						
CKR S15a			45	45	45	45	45																	
CKR S15b			45	45	45	45	45																	
CKR S16			45	45	45	45	45																	
CKR S17			46	46	46	46	46																	
CKR S18								45	45	45														
CKR S19a											42	42	42	42	42	42								
CKR S19b											42	42	42	42	42	42								
CKR S20															45	45	45	45	45	49	46	46	46	
CKR S22																								
CKR S24																								
CKR S32	48	47	47	47	47	47	47	48																
CKR S34	45	45	45	45	45	45	45	45	45	45	45													
CKR S35	44	44	44	44	44	44	44	44	44	44	44													
SCL TKW S1	46	46	46	46	46	46																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	61	61	55	55	55	55	54	53	51	51	51	48	48	48	50	50	49	49	50	50	48	48	48	
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN8 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	40	40	40	40	40	40																		
CKR S2							38	38	38	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
CKR S3a							37	37	37	37	37	37												
CKR S3b							37	37	37	37	37	37												
CKR S3c													39	39	39	39	39	39	39	42	42	42	42	42
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	35	35	35	35	35	35	35	35	35															
CKR S7	52	52	52	52	52	52																		
CKR S8	54	54	54	54	54	54																		
CKR S9							51	51																
CKR S10									50	50	50	50	50											
CKR S11												51	51	51	51	51	55	52	52	52	52	51		
CKR S12a																							51	51
CKR S12b																							51	51
CKR S13	37	37	37	38	38	38	38																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	45	45	45	45	45	45	45	45	45	45	45	45												
CKR S24	47	47	47	47	47	47	47	48	48	48	48	48	48	48	48	48	48	48	48					
CKR S32																							45	45
CKR S34						46	46	46	46	46	46	46	46	46	46	43	43	43	43	43	43	43	43	43
CKR S35					45	45	45	45	45	45	45	45	45	45	45	42	42	42	42	42	42	42	42	42
SCL TKW S1	55	56	56	56	55	54	54	54	54	54	54	54	54	52	52	52	52	52	52	52	50	50	50	50
SCL TKW S8	54	54	54																					
SCL TKW S9	55	55	55																					
SCL TKW S10	55	55	55																					
SCL TKW S11	55	55	55																					
SCL TKW S13	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50									
KTD 226	47	47	47	47	47	47	47	47	47	47	47	47												
KTD 227	48	48	48	48	48	48	48	48	48	48	48	48												
KTD 403	48	48	48	48																				
KTD 405					45	45	45	45	45	45	45	45	45	45	45	45								
KTD 621	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
KTD 628							67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
KTD 629																			61	61	61	61	61	61
KTD 630	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
KTD 631	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51
KTD 632	48	48	48	48	48	48	48	48	48	48	48	48												
KTD 633	53	53	53	53	53	53	53	53	53	53	53	53												
KTD 634	53	53	53	53	53	53	53	53	53	53	53	53												
KTD 635	79	79	79	79	79	79																		
KTD 636	79	79	79	79	79	79																		
Total SPL, dB(A)	82	82	82	82	82	82	68	68	68	68	68	68	67	67	67	67	67	67	68	68	68	68	68	68
Exceedance	7	7	7	7	7	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN8

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
CKR S3a																								
CKR S3b																								
CKR S3c	42	42	39	39	39																			
CKR S4a							37	37	37	37														
CKR S4b							37	37	37	37														
CKR S4c										39	39	39	39	39	42	42	42	42	44	39				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	53	53																						
CKR S14b	53	53																						
CKR S15a			41	41	41	41	41																	
CKR S15b			41	41	41	41	41																	
CKR S16			41	41	41	41	41																	
CKR S17			42	42	42	42	42																	
CKR S18								41	41	41														
CKR S19a											39	39	39	39	39	39								
CKR S19b											39	39	39	39	39	39								
CKR S20															42	42	42	42	42	46	43	43	43	43
CKR S22																								
CKR S24																								
CKR S32	45	44	44	44	44	44	44	45																
CKR S34	43	43	43	43	43	43	43	43	43	43	43													
CKR S35	42	42	42	42	42	42	42	42	42	42	42													
SCL TKW S1	50	50	50	50	50	50																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	58	58	54	54	54	54	51	50	48	48	48	45	45	45	47	47	46	46	47	47	45	45	45	45
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN9 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	37	37	37	37	37	37																		
CKR S2							35	35	35	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
CKR S3a							34	34	34	34	34	34												
CKR S3b							34	34	34	34	34	34												
CKR S3c													36	36	36	36	36	36	36	39	39	39	39	39
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	33	33	33	33	33	33	33	33	33															
CKR S7	51	51	51	51	51	51																		
CKR S8	53	53	53	53	53	53																		
CKR S9							50	50																
CKR S10									49	49	49	49	49											
CKR S11												50	50	50	50	50	54	51	51	51	51	50		
CKR S12a																						50	50	
CKR S12b																						50	50	
CKR S13	35	35	35	36	36	36	36																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	44	44	44	44	44	44	44	44	44	44	44	44												
CKR S24	47	47	47	47	47	47	47	48	48	48	48	48	48	48	48	48	48	48						
CKR S32																						46	46	
CKR S34							47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44
CKR S35							46	46	46	46	46	46	46	46	46	43	43	43	43	43	43	43	43	43
SCL TKW S1	60	61	61	61	60	59	59	59	59	59	59	59	59	57	57	57	57	57	57	57	55	55	55	55
SCL TKW S8	53	53	53																					
SCL TKW S9	52	52	52																					
SCL TKW S10	52	52	52																					
SCL TKW S11	52	52	52																					
SCL TKW S13	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55									
KTD 226	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 227	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 403	50	50	50	50																				
KTD 405					46	46	46	46	46	46	46	46	46	46	46									
KTD 621	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
KTD 628							60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
KTD 629																			54	54	54	54	54	54
KTD 630	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
KTD 631	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
KTD 632	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 633	56	56	56	56	56	56	56	56	56	56	56	56												
KTD 634	56	56	56	56	56	56	56	56	56	56	56	56												
KTD 635	63	63	63	63	63	63																		
KTD 636	63	63	63	63	63	63																		
Total SPL, dB(A)	69	69	69	69	69	68	66	66	66	66	66	66	64	64	64	63	63	63	63	63	63	63	63	63
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN9 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
CKR S3a																								
CKR S3b																								
CKR S3c	39	39	36	36	36																			
CKR S4a							34	34	34	34														
CKR S4b							34	34	34	34														
CKR S4c										36	36	36	36	36	39	39	39	39	41	36				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	52	52																						
CKR S14b	52	52																						
CKR S15a			40	40	40	40	40																	
CKR S15b			40	40	40	40	40																	
CKR S16			40	40	40	40	40																	
CKR S17			41	41	41	41	41																	
CKR S18								40	40	40														
CKR S19a											37	37	37	37	37	37								
CKR S19b											37	37	37	37	37	37								
CKR S20															40	40	40	40	40	44	41	41	41	41
CKR S22																								
CKR S24																								
CKR S32	46	45	45	45	45	45	45	46																
CKR S34	44	44	44	44	44	44	44	44	44	44	44													
CKR S35	43	43	43	43	43	43	43	43	43	43	43													
SCL TKW S1	55	55	55	55	55	55																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	58	58	56	56	56	56	51	50	48	48	48	43	43	43	45	45	44	44	45	45	43	43	43	43
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN10 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	36	36	36	36	36	36																		
CKR S2							34	34	34	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
CKR S3a							33	33	33	33	33	33												
CKR S3b							33	33	33	33	33	33												
CKR S3c													35	35	35	35	35	35	35	38	38	38	38	38
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	32	32	32	32	32	32	32	32	32															
CKR S7	50	50	50	50	50	50																		
CKR S8	52	52	52	52	52	52																		
CKR S9							49	49																
CKR S10									48	48	48	48	48											
CKR S11												49	49	49	49	49	53	50	50	50	50	49		
CKR S12a																							49	49
CKR S12b																							49	49
CKR S13	34	34	34	35	35	35	35																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	44	44	44	44	44	44	44	44	44	44	44	44												
CKR S24	47	47	47	47	47	47	47	48	48	48	48	48	48	48	48	48	48	48						
CKR S32																							46	46
CKR S34						48	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45
CKR S35						47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44
SCL TKW S1	58	59	59	59	58	57	57	57	57	57	57	57	57	55	55	55	55	55	55	55	53	53	53	53
SCL TKW S8	50	50	50																					
SCL TKW S9	50	50	50																					
SCL TKW S10	50	50	50																					
SCL TKW S11	49	49	49																					
SCL TKW S13	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53									
KTD 226	50	50	50	50	50	50	50	50	50	50	50	50												
KTD 227	51	51	51	51	51	51	51	51	51	51	51	51												
KTD 403	51	51	51	51																				
KTD 405					47	47	47	47	47	47	47	47	47	47	47	47								
KTD 621	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
KTD 628							56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56
KTD 629																			50	50	50	50	50	50
KTD 630	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
KTD 631	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
KTD 632	50	50	50	50	50	50	50	50	50	50	50	50												
KTD 633	55	55	55	55	55	55	55	55	55	55	55	55												
KTD 634	55	55	55	55	55	55	55	55	55	55	55	55												
KTD 635	57	57	57	57	57	57																		
KTD 636	57	57	57	57	57	57																		
Total SPL, dB(A)	66	66	66	66	66	66	64	64	64	64	64	64	63	62	62	61	61	61	61	61	61	61	61	61
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN10 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
CKR S3a																								
CKR S3b																								
CKR S3c	38	38	35	35	35																			
CKR S4a								33	33	33	33													
CKR S4b								33	33	33	33													
CKR S4c										35	35	35	35	35	38	38	38	38	40	35				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	51	51																						
CKR S14b	51	51																						
CKR S15a			39	39	39	39	39																	
CKR S15b			39	39	39	39	39																	
CKR S16			39	39	39	39	39																	
CKR S17			40	40	40	40	40																	
CKR S18								39	39	39														
CKR S19a											36	36	36	36	36	36								
CKR S19b											36	36	36	36	36	36								
CKR S20															39	39	39	39	39	43	40	40	40	40
CKR S22																								
CKR S24																								
CKR S32	46	45	45	45	45	45	45	46																
CKR S34	45	45	45	45	45	45	45	45	45	45	45													
CKR S35	44	44	44	44	44	44	44	44	44	44	44													
SCL TKW S1	53	53	53	53	53	53																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	57	57	55	55	55	55	51	50	48	48	48	42	42	42	44	44	43	43	44	44	42	42	42	42
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN11 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	34	34	34	34	34	34																		
CKR S2							32	32	32	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
CKR S3a							31	31	31	31	31	31												
CKR S3b							31	31	31	31	31	31												
CKR S3c													33	33	33	33	33	33	33	36	36	36	36	36
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	31	31	31	31	31	31	31	31	31															
CKR S7	49	49	49	49	49	49																		
CKR S8	51	51	51	51	51	51																		
CKR S9							48	48																
CKR S10									47	47	47	47	47											
CKR S11												48	48	48	48	48	52	49	49	49	49	48		
CKR S12a																							48	48
CKR S12b																							48	48
CKR S13	32	32	32	33	33	33	33																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	43	43	43	43	43	43	43	43	43	43	43													
CKR S24	46	46	46	46	46	46	46	47	47	47	47	47	47	47	47	47	47	47						
CKR S32																							46	46
CKR S34						48	48	48	48	48	48	48	48	48	48	45	45	45	45	45	45	45	45	45
CKR S35						47	47	47	47	47	47	47	47	47	47	44	44	44	44	44	44	44	44	44
SCL TKW S1	52	53	53	53	52	51	51	51	51	51	51	51	51	49	49	49	49	49	49	49	47	47	47	47
SCL TKW S8	47	47	47																					
SCL TKW S9	46	46	46																					
SCL TKW S10	46	46	46																					
SCL TKW S11	46	46	46																					
SCL TKW S13	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47									
KTD 226	53	53	53	53	53	53	53	53	53	53	53													
KTD 227	55	55	55	55	55	55	55	55	55	55	55													
KTD 403	53	53	53	53																				
KTD 405					48	48	48	48	48	48	48	48	48	48	48									
KTD 621	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
KTD 628							52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
KTD 629																			46	46	46	46	46	46
KTD 630	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49
KTD 631	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
KTD 632	56	56	56	56	56	56	56	56	56	56	56													
KTD 633	51	51	51	51	51	51	51	51	51	51	51													
KTD 634	51	51	51	51	51	51	51	51	51	51	51													
KTD 635	53	53	53	53	53	53																		
KTD 636	53	53	53	53	53	53																		
Total SPL, dB(A)	65	65	65	65	65	65	64	64	64	64	64	64	62	62	62	61	61	61	61	61	61	61	61	61
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN11 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
CKR S3a																								
CKR S3b																								
CKR S3c	36	36	33	33	33																			
CKR S4a							31	31	31	31														
CKR S4b							31	31	31	31														
CKR S4c										33	33	33	33	33	36	36	36	36	38	33				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	49	49																						
CKR S14b	49	49																						
CKR S15a			37	37	37	37	37																	
CKR S15b			37	37	37	37	37																	
CKR S16			37	37	37	37	37																	
CKR S17			38	38	38	38	38																	
CKR S18								37	37	37														
CKR S19a											34	34	34	34	34	34								
CKR S19b											34	34	34	34	34	34								
CKR S20															37	37	37	37	37	41	38	38	38	38
CKR S22																								
CKR S24																								
CKR S32	46	45	45	45	45	45	45	46																
CKR S34	45	45	45	45	45	45	45	45	45	45	45													
CKR S35	44	44	44	44	44	44	44	44	44	44	44													
SCL TKW S1	47	47	47	47	47	47																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	55	55	52	52	52	52	51	51	49	49	49	40	40	40	42	42	41	41	42	43	40	40	40	40
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN12 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	34	34	34	34	34	34																		
CKR S2							32	32	32	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
CKR S3a							31	31	31	31	31	31												
CKR S3b							31	31	31	31	31	31												
CKR S3c													33	33	33	33	33	33	33	36	36	36	36	36
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	31	31	31	31	31	31	31	31	31															
CKR S7	49	49	49	49	49	49																		
CKR S8	51	51	51	51	51	51																		
CKR S9							48	48																
CKR S10									47	47	47	47	47											
CKR S11												48	48	48	48	48	52	49	49	49	49	48		
CKR S12a																							48	48
CKR S12b																							48	48
CKR S13	32	32	32	33	33	33	33																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	43	43	43	43	43	43	43	43	43	43	43	43												
CKR S24	46	46	46	46	46	46	46	47	47	47	47	47	47	47	47	47	47	47	47					
CKR S32																							48	48
CKR S34						50	50	50	50	50	50	50	50	50	50	47	47	47	47	47	47	47	47	47
CKR S35						49	49	49	49	49	49	49	49	49	49	46	46	46	46	46	46	46	46	46
SCL TKW S1	49	50	50	50	49	48	48	48	48	48	48	48	48	46	46	46	46	46	46	46	46	44	44	44
SCL TKW S8	45	45	45																					
SCL TKW S9	44	44	44																					
SCL TKW S10	44	44	44																					
SCL TKW S11	44	44	44																					
SCL TKW S13	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44									
KTD 226	55	55	55	55	55	55	55	55	55	55	55	55												
KTD 227	57	57	57	57	57	57	57	57	57	57	57	57												
KTD 403	56	56	56	56																				
KTD 405					51	51	51	51	51	51	51	51	51	51	51	51								
KTD 621	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
KTD 628							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
KTD 629																			44	44	44	44	44	44
KTD 630	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
KTD 631	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
KTD 632	62	62	62	62	62	62	62	62	62	62	62	62												
KTD 633	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 634	49	49	49	49	49	49	49	49	49	49	49	49												
KTD 635	51	51	51	51	51	51																		
KTD 636	51	51	51	51	51	51																		
Total SPL, dB(A)	69	69	69	69	69	69	68	68	68	68	68	68	66	66	66	66	66	66	66	66	66	66	66	66
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN12

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
CKR S3a																								
CKR S3b																								
CKR S3c	36	36	33	33	33																			
CKR S4a							31	31	31	31														
CKR S4b							31	31	31	31														
CKR S4c										33	33	33	33	33	36	36	36	36	38	33				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	50	50																						
CKR S14b	50	50																						
CKR S15a			38	38	38	38	38																	
CKR S15b			38	38	38	38	38																	
CKR S16			38	38	38	38	38																	
CKR S17			39	39	39	39	39																	
CKR S18								38	38	38														
CKR S19a											34	34	34	34	34	34								
CKR S19b											34	34	34	34	34	34								
CKR S20															37	37	37	37	37	41	38	38	38	38
CKR S22																								
CKR S24																								
CKR S32	48	47	47	47	47	47	47	48																
CKR S34	47	47	47	47	47	47	47	47	47	47	47													
CKR S35	46	46	46	46	46	46	46	46	46	46	46													
SCL TKW S1	44	44	44	44	44	44																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	56	56	53	53	53	53	52	52	50	50	50	40	40	40	42	42	41	41	41	42	40	40	40	40
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN13 Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2017												2018											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
CKR S1	35	35	35	35	35	35																		
CKR S2							32	32	32	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
CKR S3a							31	31	31	31	31	31												
CKR S3b							31	31	31	31	31	31												
CKR S3c													33	33	33	33	33	33	33	36	36	36	36	36
CKR S4a																								
CKR S4b																								
CKR S4c																								
CKR S6	31	31	31	31	31	31	31	31	31															
CKR S7	51	51	51	51	51	51																		
CKR S8	53	53	53	53	53	53																		
CKR S9							50	50																
CKR S10									49	49	49	49	49											
CKR S11												50	50	50	50	50	54	51	51	51	51	50		
CKR S12a																							50	50
CKR S12b																							50	50
CKR S13	33	33	33	34	34	34	34																	
CKR S14a																								
CKR S14b																								
CKR S15a																								
CKR S15b																								
CKR S16																								
CKR S17																								
CKR S18																								
CKR S19a																								
CKR S19b																								
CKR S20																								
CKR S22	45	45	45	45	45	45	45	45	45	45	45	45												
CKR S24	48	48	48	48	48	48	48	49	49	49	49	49	49	49	49	49	49	49	49					
CKR S32																							54	54
CKR S34						57	57	57	57	57	57	57	57	57	57	54	54	54	54	54	54	54	54	54
CKR S35						56	56	56	56	56	56	56	56	56	56	53	53	53	53	53	53	53	53	53
SCL TKW S1	47	48	48	48	47	46	46	46	46	46	46	46	46	44	44	44	44	44	44	44	42	42	42	42
SCL TKW S8	43	43	43																					
SCL TKW S9	43	43	43																					
SCL TKW S10	43	43	43																					
SCL TKW S11	43	43	43																					
SCL TKW S13	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42									
KTD 226	52	52	52	52	52	52	52	52	52	52	52	52												
KTD 227	57	57	57	57	57	57	57	57	57	57	57	57												
KTD 403	63	63	63	63																				
KTD 405					59	59	59	59	59	59	59	59	59	59	59									
KTD 621	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73
KTD 628							50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
KTD 629																			44	44	44	44	44	44
KTD 630	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73
KTD 631	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
KTD 632	70	70	70	70	70	70	70	70	70	70	70	70												
KTD 633	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 634	46	46	46	46	46	46	46	46	46	46	46	46												
KTD 635	51	51	51	51	51	51																		
KTD 636	51	51	51	51	51	51																		
Total SPL, dB(A)	77	77	77	77	77	77	77	77	77	77	77	77	76	76	76	76	76	76	76	76	76	76	76	76
Exceedance	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1

Appendix 5.2M - Construction Noise Calculation for Concurrent Projects

NSR: CN13

Criteria: 75 dB(A)

Zone	SPL, dB(A)																							
	2019												2020											
	Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
CKR S1																								
CKR S2	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
CKR S3a																								
CKR S3b																								
CKR S3c	36	36	33	33	33																			
CKR S4a							31	31	31	31														
CKR S4b							31	31	31	31														
CKR S4c										33	33	33	33	33	36	36	36	36	38	33				
CKR S6																								
CKR S7																								
CKR S8																								
CKR S9																								
CKR S10																								
CKR S11																								
CKR S12a																								
CKR S12b																								
CKR S13																								
CKR S14a	52	52																						
CKR S14b	52	52																						
CKR S15a			40	40	40	40	40																	
CKR S15b			40	40	40	40	40																	
CKR S16			40	40	40	40	40																	
CKR S17			41	41	41	41	41																	
CKR S18								40	40	40														
CKR S19a											35	35	35	35	35	35								
CKR S19b											35	35	35	35	35	35								
CKR S20															38	38	38	38	38	42	39	39	39	39
CKR S22																								
CKR S24																								
CKR S32	54	53	53	53	53	53	53	54																
CKR S34	54	54	54	54	54	54	54	54	54	54	54													
CKR S35	53	53	53	53	53	53	53	53	53	53	53													
SCL TKW S1	42	42	42	42	42	42																		
SCL TKW S8																								
SCL TKW S9																								
SCL TKW S10																								
SCL TKW S11																								
SCL TKW S13																								
KTD 226																								
KTD 227																								
KTD 403																								
KTD 405																								
KTD 621																								
KTD 628																								
KTD 629																								
KTD 630																								
KTD 631																								
KTD 632																								
KTD 633																								
KTD 634																								
KTD 635																								
KTD 636																								
Total SPL, dB(A)	60	60	58	58	58	58	58	58	56	56	56	41	41	41	43	43	42	42	42	43	41	41	41	41
Exceedance	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 5.2N

**Construction Noise Levels from the
Concurrent Projects**

Appendix 5.2N - Construction Noise Levels from the Concurrent Projects

NSR	Noise Criteria, dB(A)	Max	SPL, dB(A)																							
			2017												2018											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24			
CN1	75	67	67	67	67	67	67	67	64	64	64	64	64	65	65	64	64	63	65	64	64	63	64	64		
CN2	75	71	71	71	71	71	71	71	69	69	69	69	69	69	68	68	68	68	69	68	68	69	69	68	69	
CN3	75	73	73	73	73	73	73	73	70	70	70	70	70	71	70	70	70	70	70	70	70	70	70	70	70	
CN4	75	70	70	70	70	70	70	70	67	67	67	67	67	67	66	66	66	66	66	66	67	67	67	67	67	
CN5	75	74	74	74	74	73	73	73	64	64	64	64	64	65	63	63	63	63	63	63	63	63	63	63	63	
CN6	75	72	72	72	72	72	72	72	72	72	72	72	72	72	59	59	59	59	58	58	58	58	58	58	58	
CN7	75	81	81	81	81	81	81	81	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	
CN8	75	82	82	82	82	82	82	82	68	68	68	68	68	68	67	67	67	67	67	67	68	68	68	68	68	
CN9	75	69	69	69	69	69	69	68	66	66	66	66	66	66	64	64	64	63	63	63	63	63	63	63	63	
CN10	75	66	66	66	66	66	66	66	64	64	64	64	64	64	63	62	62	61	61	61	61	61	61	61	61	
CN11	75	65	65	65	65	65	65	65	64	64	64	64	64	64	62	62	62	61	61	61	61	61	61	61	61	
CN12	75	69	69	69	69	69	69	69	68	68	68	68	68	68	66	66	66	66	66	66	66	66	66	66	66	
CN13	75	77	77	77	77	77	77	77	77	77	77	77	77	77	76	76	76	76	76	76	76	76	76	76	76	

NSR	Noise Criteria, dB(A)	Max	SPL, dB(A)																							
			2019												2020											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48			
CN1	75	67	65	65	61	61	61	61	61	57	56	56	56	55	55	55	58	58	56	56	57	58	55	55	55	
CN2	75	71	62	62	56	56	56	56	56	53	52	52	52	51	51	51	53	53	51	51	52	53	50	50	50	
CN3	75	73	62	62	56	56	56	56	55	53	52	52	52	50	50	50	52	52	51	51	51	52	49	49	49	
CN4	75	70	59	59	54	54	54	54	53	51	50	49	50	47	47	47	50	50	48	48	49	49	47	47	47	
CN5	75	74	57	57	54	54	54	54	50	49	47	47	47	44	44	44	46	46	45	45	46	46	44	44	44	
CN6	75	72	54	54	51	51	51	52	51	51	49	49	49	38	38	38	40	40	39	39	40	41	38	38	38	
CN7	75	81	61	61	55	55	55	55	54	53	51	51	51	48	48	48	50	50	49	49	50	50	48	48	48	
CN8	75	82	58	58	54	54	54	54	51	50	48	48	48	45	45	45	47	47	46	46	47	47	45	45	45	
CN9	75	69	58	58	56	56	56	56	51	50	48	48	48	43	43	43	45	45	44	44	45	45	43	43	43	
CN10	75	66	57	57	55	55	55	55	51	50	48	48	48	42	42	42	44	44	43	43	44	44	42	42	42	
CN11	75	65	55	55	52	52	52	52	51	51	49	49	49	40	40	40	42	42	41	41	42	43	40	40	40	
CN12	75	69	56	56	53	53	53	53	52	52	50	50	50	40	40	40	42	42	41	41	41	42	40	40	40	
CN13	75	77	60	60	58	58	58	58	58	58	56	56	56	41	41	41	43	43	42	42	42	43	41	41	41	

Appendix 5.20

**Cumulative Construction Noise Levels
(Unmitigated)**

Appendix 5.20 - Cumulative Construction Noise Levels (Unmitigated)

NSR	Noise Criteria, dB(A)	Max	SPL, dB(A)																							
			2017												2018											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24			
CN1	75	78	78	78	78	75	74	74	74	74	74	74	75	75	75	74	74	73	73	72	72	71	71	71	72	74
CN2	75	80	80	80	80	77	77	77	77	77	77	77	77	78	78	78	77	77	75	74	74	74	74	74	74	76
CN3	75	82	81	82	81	78	78	78	78	78	78	78	79	79	79	79	78	78	76	76	76	75	75	75	75	77
CN4	75	78	77	78	77	75	75	75	74	74	74	74	75	75	76	75	75	75	72	71	72	72	72	72	73	
CN5	75	78	78	78	78	76	76	76	73	73	73	73	74	74	74	73	73	72	70	70	70	70	70	70	72	
CN6	75	77	77	77	76	75	74	74	74	74	74	74	75	75	71	72	71	71	70	68	68	68	68	68	69	
CN7	75	85	85	85	84	83	83	83	78	78	78	79	79	79	80	79	79	79	77	77	77	76	76	76	77	
CN8	75	83	83	83	83	83	83	83	75	75	75	75	75	75	76	76	76	76	73	72	73	73	73	73	73	
CN9	75	81	81	81	80	79	79	78	78	78	78	78	79	78	80	80	80	80	76	76	76	75	75	75	76	
CN10	75	82	81	82	81	80	78	78	78	78	78	78	78	78	80	80	80	80	77	75	75	75	75	75	76	
CN11	75	82	81	82	81	79	78	78	78	78	78	78	78	78	80	80	80	80	75	75	75	75	75	75	76	
CN12	75	83	83	83	79	78	77	77	77	77	77	77	77	78	78	77	78	78	78	78	74	74	74	74	76	
CN13	75	82	82	82	81	79	79	79	79	79	79	79	80	80	79	79	79	79	78	77	77	77	77	77	79	

NSR	Noise Criteria, dB(A)	Max	SPL, dB(A)																							
			2019												2020											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48			
CN1	75	78	74	74	73	73	69	64	64	62	60	60	60	59	59	59	61	62	61	61	61	61	61	60	58	59
CN2	75	80	74	74	74	74	69	64	64	63	60	60	60	60	60	60	61	62	61	61	61	61	61	60	58	59
CN3	75	82	76	76	75	75	70	65	65	64	61	61	62	61	61	61	62	62	62	62	61	62	61	59	59	
CN4	75	78	71	71	71	71	66	63	63	62	58	58	58	57	57	57	58	59	58	58	59	58	57	56	56	
CN5	75	78	70	70	69	69	65	62	61	61	57	57	57	56	56	56	56	57	57	57	57	56	56	54	54	
CN6	75	77	69	69	69	69	65	63	63	63	55	55	56	55	55	55	55	56	56	56	56	56	56	54	54	
CN7	75	85	77	77	76	76	70	65	65	65	62	62	62	62	62	62	62	63	63	63	63	62	62	60	60	
CN8	75	83	71	71	71	71	66	63	62	62	58	58	58	58	58	58	58	58	58	59	58	58	57	56	56	
CN9	75	81	73	73	72	72	69	67	67	67	62	62	62	62	62	62	62	63	63	63	63	61	61	60	60	
CN10	75	82	75	75	74	74	71	70	70	70	62	62	62	62	62	62	63	63	63	63	63	63	61	60	60	
CN11	75	82	76	76	76	76	74	73	73	73	62	62	62	62	62	63	63	63	63	63	63	63	61	61	61	
CN12	75	83	74	74	74	74	72	71	71	71	60	60	60	63	63	64	64	64	64	64	64	64	64	63	63	
CN13	75	82	75	75	75	75	70	68	68	68	60	60	61	60	60	61	61	62	62	62	62	62	61	61	61	

Appendix 5.2P

**Cumulative Construction Noise Levels
(Mitigated)**

Appendix 5.2P - Cumulative Construction Noise Levels (Mitigated)

NSR	Noise Criteria, dB(A)	Max	SPL, dB(A)																							
			2017												2018											
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4		
M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24			
CN1	75	71	71	71	71	69	69	69	67	67	67	68	68	69	70	69	68	68	68	68	67	67	67	67	68	69
CN2	75	74	74	74	73	72	72	72	71	71	71	72	71	72	72	73	72	72	71	71	71	71	71	71	71	72
CN3	75	75	75	75	75	74	74	74	72	72	72	72	73	74	74	73	73	73	72	72	72	72	72	72	72	73
CN4	75	72	72	72	71	71	71	71	68	68	68	69	69	70	70	70	70	69	68	69	69	69	69	69	69	70
CN5	75	75	75	75	75	73	73	73	66	66	66	67	67	68	68	68	68	67	66	66	66	66	66	66	67	
CN6	75	73	73	73	73	72	72	72	72	72	72	72	72	73	65	65	65	65	64	63	63	63	63	63	64	
CN7	75	82	82	82	82	81	81	81	71	71	71	72	72	73	73	73	72	72	72	72	72	72	72	72	72	
CN8	75	82	82	82	82	82	82	82	69	69	69	70	70	71	71	71	71	70	69	70	70	70	70	70	70	
CN9	75	74	73	73	73	72	72	72	71	71	71	71	71	72	74	74	74	73	71	71	71	71	71	71	71	
CN10	75	73	72	73	72	71	70	70	69	69	69	70	70	71	73	73	72	72	71	70	70	70	70	70	71	
CN11	75	73	72	73	72	70	70	70	69	69	69	70	70	70	72	73	73	73	72	70	70	70	70	70	71	
CN12	75	75	74	75	72	71	71	71	71	71	71	71	71	71	71	72	72	72	71	70	70	70	70	70	71	
CN13	75	78	78	78	78	77	77	77	77	77	77	77	77	78	77	77	77	77	77	76	76	76	76	76	77	

NSR	Noise Criteria, dB(A)	Max	SPL, dB(A)																								
			2019												2020												
			Q1			Q2			Q3			Q4			Q1			Q2			Q3			Q4			
M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48				
CN1	75	71	69	69	68	68	64	63	63	61	60	60	60	59	59	59	61	62	61	61	61	61	61	60	58	58	59
CN2	75	74	69	69	68	68	63	61	61	61	60	60	60	60	60	60	61	62	61	61	61	61	61	60	58	58	59
CN3	75	75	70	71	69	69	64	62	62	62	61	61	62	61	61	61	62	62	62	62	61	62	61	59	59	59	
CN4	75	72	66	66	65	65	61	59	59	59	58	58	58	57	57	57	58	59	58	58	59	58	57	56	56	56	
CN5	75	75	65	65	64	64	59	59	58	58	57	57	57	56	56	56	56	57	57	57	57	56	56	54	54	54	
CN6	75	73	64	64	63	63	59	58	58	58	55	55	56	55	55	55	56	56	56	56	56	56	56	54	54	54	
CN7	75	82	71	71	70	70	65	64	64	63	62	62	62	62	62	62	62	63	63	63	63	62	62	60	60	60	
CN8	75	82	66	66	65	65	61	59	59	59	58	58	58	58	58	58	58	58	59	58	58	57	56	56	56	56	
CN9	75	74	68	68	67	67	65	64	63	63	62	62	62	62	62	62	63	63	63	63	63	61	61	60	60	60	
CN10	75	73	69	69	68	68	65	65	64	64	62	62	62	62	62	62	63	63	63	63	63	63	61	60	60	60	
CN11	75	73	70	70	70	70	66	66	66	66	62	62	62	62	62	63	63	63	63	63	63	63	63	61	61	61	
CN12	75	75	68	68	69	69	65	64	64	64	60	60	63	63	63	64	64	64	64	64	64	64	64	63	63	63	
CN13	75	78	70	70	69	69	63	62	62	62	60	60	61	60	60	61	61	62	62	62	62	62	62	61	61	61	

Appendix 5.3A

Year 2036 Traffic Forecast

Year 2036 Traffic Forecast for Noise Assessment (Without Development)

Road ID	Road Name	Direction	Traffic Flow (veh/hr)	Heavy Vehicles (%)	Speed (Km/h)
1	Sung Wong Toi Road	EB	700	16.0%	50
2	Sung Wong Toi Road	WB	990	18.0%	50
3	Slip Road to Sung Wong Toi Road	SB	480	22.0%	50
4	Sung Wong Toi Road	WB	1900	23.0%	50
5	Slip Road of Kai Tak Tunnel	WB	940	27.0%	50
6	Sung Wong Toi Road	WB	2410	23.0%	50
7	Sung Wong Toi Road	WB	2440	23.0%	50
8	Sung Wong Toi Road	WB	2310	22.0%	50
9	Kai Tak Tunnel	NB	3340	24.0%	70
10	Kai Tak Tunnel	SB	2050	31.0%	70
11	Olympic Avenue	EB	1170	18.0%	50
12	Olympic Avenue	EB	700	16.0%	50
13	To Kwa Wan Road	NB	1130	17.0%	50
14	To Kwa Wan Road	SB	470	25.0%	50
15	To Kwa Wan Road	NB	800	22.0%	50
16	To Kwa Wan Road	SB	880	32.0%	50
17	To Kwa Wan Road	NB	1410	34.0%	50
18	To Kwa Wan Road	SB	810	30.0%	50
19	Ma Tau Kok Road	EB	110	35.0%	50
20	Ma Tau Kok Road	WB	110	31.0%	50
21	Ma Tau Kok Road	WB	750	41.0%	50
22	Ma Tau Kok Road	WB	290	85.0%	50
23	Ma Tau Kok Road	WB	190	86.0%	50
24	Ma Tau Kok Road	WB	130	80.0%	50
25	Mok Cheong Street	EB	520	36.0%	50
26	Mok Cheong Street	EB	470	33.0%	50
27	Mok Cheong Street	EB	420	35.0%	50
28	Mok Cheong Street	EB	420	35.0%	50
29	Mok Cheong Street	EB	850	24.0%	50
30	Ma Tau Chung Road	NB	1510	55.0%	50
31	Ma Tau Chung Road	SB	1590	42.0%	50
32	Tam Kung Road	SB	150	25.0%	50
33	Tam Kung Road	SB	160	34.0%	50
34	Pak Tai Street	NB	50	21.0%	50
35	Pak Tai Street	NB	50	20.0%	50
36	Pak Tai Street	NB	50	31.0%	50
37	Pau Chung Street	SB	50	29.0%	50
38	Pau Chung Street	NB	50	59.0%	50
39	Pau Chung Street	SB	50	67.0%	50
40	Kowloon City Road	NB	800	19.0%	50
41	Kowloon City Road	NB	1000	24.0%	50
42	Kowloon City Road	NB	650	30.0%	50
43	Olympic Avenue	NB	430	28.0%	50
44	Olympic Avenue	SB	1170	18.0%	50
45	Olympic Avenue	NB	520	22.0%	50
46	Olympic Avenue	SB	520	22.0%	50
47	Olympic Avenue	NB	440	23.0%	50
48	Olympic Avenue	SB	460	22.0%	50
49	Olympic Avenue	NB	300	29.0%	50
50	Olympic Avenue	SB	460	22.0%	50
51	Olympic Avenue	NB	310	26.0%	50
52	Olympic Avenue	SB	470	20.0%	50
53	Olympic Avenue	NB	630	20.0%	50
54	Olympic Avenue	SB	480	21.0%	50
55	Road D1	EB	1350	20.0%	50
56	Road D1	WB	620	21.0%	50
57	Road L9	EB	360	18.0%	50
58	Road L9	WB	330	19.0%	50

Year 2036 Traffic Forecast for Noise Assessment (Without Development)

Road ID	Road Name	Direction	Traffic Flow (veh/hr)	Heavy Vehicles (%)	Speed (Km/h)
59	Road L9	EB	140	20.0%	50
60	Road L9	WB	90	19.0%	50
61	Road L16	NB	200	18.0%	50
62	Road L16	SB	250	19.0%	50
63	road L7	EB	240	17.0%	50
64	road L7	WB	230	19.0%	50
65	Shing Kai Road	NB	620	14.0%	50
66	Shing Kai Road	SB	780	11.0%	50
67	Road D2	EB	600	13.0%	50
68	Road D2	WB	900	9.0%	50
69	Road D2	NB	580	12.0%	50
70	Road D2	SB	890	10.0%	50
71	Road D2	NB	830	12.0%	50
72	Road D2	SB	650	10.0%	50
73	Road D2	NB	930	8.0%	50
74	Road D2	SB	670	11.0%	50
75	Road L5	NB	50	14.0%	50
76	Road L5	SB	80	14.0%	50
77	Road L6	NB	150	10.0%	50
78	Road L6	SB	100	16.0%	50
79	Road D3	NB	830	10.0%	50
80	Road D3	SB	770	9.0%	50
81	Road D3	NB	740	10.0%	50
82	Road D3	SB	770	9.0%	50
83	CKR	EB	4400	37.0%	80
84	CKR	WB	4660	38.0%	80
85	Slips Road of CKR	WB	810	40.0%	70
86	Slip Road of Kai Tak Tunnel	SB	740	33.0%	50
87	Shing Cheong Road	SB	2440	35.0%	80
88	Shing Cheong Road	NB	2560	32.0%	80
89	Slip Road of CKR	WB	1340	48.0%	70
90	Slip Road of CKR	EB	1660	24.0%	70
91	Slip Road of CKR	WB	2190	44.0%	70
92	Slip Road of CKR	NB	500	15.0%	70
93	Slip Road of CKR	SB	260	27.0%	70
94	Slip Road of CKR	NB	830	16.0%	70
95	Slip Road of CKR	WB	500	45.0%	70
96	Slip Road of Kai Fuk Road	EB	1100	27.0%	70
97	Slip Road of Kai Fuk Road	WB	1180	32.0%	70
98	Kai Tak Tunnel	EB	2450	22.0%	70
99	Kai Tak Tunnel	WB	2050	31.0%	70
100	Slip Road of Kai Tak Tunnel	EB	1820	22.0%	70
101	Slip Road of CKR	EB	830	34.0%	70
102	Kai Fuk Road	EB	2840	21.0%	70
103	Kai Fuk Road	WB	1440	36.0%	70
104	Kai Fuk Road	WB	3690	34.0%	70
105	Slip Road of CKR	EB	1070	46.0%	70
106	Slip Road of CKR	WB	2230	33.0%	70
107	Slip Road of Kai Tak Tunnel	EB	590	22.0%	70
108	Slip Road of Kai Cheung Road	EB	170	16.0%	50
109	Slip Road of Kai Cheung Road	SB	1000	18.0%	70
110	Slip Road of Kai Fuk Road	WB	620	21.0%	50
111	Slip Road of Kai Cheung Road	EB	760	19.0%	70
112	Slip Road of Kai Cheung Road	WB	1160	17.0%	70
113	Ma Tau Chung Road	NB	3410	33.0%	50
114	Ma Tau Chung Road	SB	1580	42.0%	50
115	Hang Wan Road	EB	760	16.0%	50
116	Ma Tau Chung Road (at-grade)	NB	1590	39.0%	50

Year 2036 Traffic Forecast for Noise Assessment (Without Development)

Road ID	Road Name	Direction	Traffic Flow (veh/hr)	Heavy Vehicles (%)	Speed (Km/h)
117	Ma Tau Chung Road (at grade)	SB	1530	33.0%	50
118	Prince Edward Road West (at grade)	NB	1960	39.0%	50
119	Ma Tau Chung Road (at grade)	SB	970	40.0%	50
120	Kowloon City Interchange	SB	910	20.0%	50
121	Argyle Street Roundabout	WB	320	32.0%	50
122	Prince Edward Road West	NB	1650	28.0%	70
123	Prince Edward Road East (f/o)	WB	2370	26.0%	70
124	Prince Edward Road East	EB	1820	28.0%	70
125	Ma Tau Chung Road (f/o)	WB	740	26.0%	70
126	Argyle Street (f/o)	EB	920	36.0%	70
127	Argyle Street (f/o)	WB	560	12.0%	70
128	Prince Edward Road West (at grade)	EB	4550	34.0%	70
129	Prince Edward Road East	EB	4200	36.0%	70
130	Ma Tau Chung Road (at grade)	WB	2280	27.0%	70
131	Kai Tak Flyover	EB	140	15.0%	50
132	Kai Tak Flyover	EB	330	18.0%	50
133	Slip Road of Prince Edward Road East	WB	1350	25.0%	70
134	Slip Road of East Kowloon Corridor	NB	260	13.0%	50
135	Slip Road of Prince Edward Road East	WB	570	19.0%	50
136	Prince Edward Road East (at grade)	EB	4380	35.0%	70
137	Argyle Street Roundabout	EB	1830	32.0%	50
138	Kowloon City Road	NB	550	23.0%	50
139	Kai Tak Tunnel	NB	3340	24.0%	70
140	Kai Tak Tunnel	SB	1310	30.0%	70
141	Shing Kai Road	NB	520	14.0%	50
142	Shing Kai Road	SB	370	11.0%	50
143	Kai Shing Street	WB	820	11.0%	50
144	Kai Shing Street	EB	490	14.0%	50

Year 2036 Traffic Forecast for Noise Assessment (With Development)

Road ID	Road Name	Direction	Traffic Flow (veh/hr)	Heavy Vehicles (%)	Speed (Km/h)
1	Sung Wong Toi Road	EB	925	15.9%	50
2	Sung Wong Toi Road	WB	1244	18.1%	50
3	Slip Road to Sung Wong Toi Road	SB	480	22.0%	50
4	Sung Wong Toi Road	WB	2145	23.0%	50
5	Slip Road of Kai Tak Tunnel	WB	940	27.0%	50
6	Sung Wong Toi Road	WB	2617	22.9%	50
7	Sung Wong Toi Road	WB	2650	23.1%	50
8	Sung Wong Toi Road	WB	2512	22.1%	50
9	Kai Tak Tunnel	NB	3340	24.0%	70
10	Kai Tak Tunnel	SB	2050	31.0%	70
11	Olympic Avenue	EB	1393	17.9%	50
12	Olympic Avenue	EB	925	15.9%	50
13	To Kwa Wan Road	NB	1361	17.0%	50
14	To Kwa Wan Road	SB	543	24.8%	50
15	To Kwa Wan Road	NB	841	22.0%	50
16	To Kwa Wan Road	SB	953	31.9%	50
17	To Kwa Wan Road	NB	1449	33.8%	50
18	To Kwa Wan Road	SB	885	29.7%	50
19	Ma Tau Kok Road	EB	110	35.0%	50
20	Ma Tau Kok Road	WB	110	31.0%	50
21	Ma Tau Kok Road	WB	750	41.0%	50
22	Ma Tau Kok Road	WB	290	85.0%	50
23	Ma Tau Kok Road	WB	190	86.0%	50
24	Ma Tau Kok Road	WB	130	80.0%	50
25	Mok Cheong Street	EB	520	36.0%	50
26	Mok Cheong Street	EB	470	33.0%	50
27	Mok Cheong Street	EB	436	34.4%	50
28	Mok Cheong Street	EB	435	34.3%	50
29	Mok Cheong Street	EB	1038	23.4%	50
30	Ma Tau Chung Road	NB	1510	55.0%	50
31	Ma Tau Chung Road	SB	1590	42.0%	50
32	Tam Kung Road	SB	159	24.8%	50
33	Tam Kung Road	SB	160	34.0%	50
34	Pak Tai Street	NB	50	21.0%	50
35	Pak Tai Street	NB	50	20.0%	50
36	Pak Tai Street	NB	50	31.0%	50
37	Pau Chung Street	SB	50	29.0%	50
38	Pau Chung Street	NB	50	59.0%	50
39	Pau Chung Street	SB	50	67.0%	50
40	Kowloon City Road	NB	973	19.3%	50
41	Kowloon City Road	NB	1170	24.0%	50
42	Kowloon City Road	NB	650	30.0%	50
43	Olympic Avenue	NB	466	28.0%	50
44	Olympic Avenue	SB	1393	17.9%	50
45	Olympic Avenue	NB	574	21.8%	50
46	Olympic Avenue	SB	520	22.0%	50
47	Olympic Avenue	NB	466	23.0%	50
48	Olympic Avenue	SB	460	22.0%	50
49	Olympic Avenue	NB	324	28.7%	50
50	Olympic Avenue	SB	460	22.0%	50
51	Olympic Avenue	NB	310	26.0%	50
52	Olympic Avenue	SB	470	20.0%	50
53	Olympic Avenue	NB	630	20.0%	50
54	Olympic Avenue	SB	480	21.0%	50
55	Road D1	EB	1415	20.1%	50
56	Road D1	WB	620	21.0%	50
57	Road L9	EB	386	17.8%	50
58	Road L9	WB	330	19.0%	50

Year 2036 Traffic Forecast for Noise Assessment (With Development)

Road ID	Road Name	Direction	Traffic Flow (veh/hr)	Heavy Vehicles (%)	Speed (Km/h)
59	Road L9	EB	140	20.0%	50
60	Road L9	WB	90	19.0%	50
61	Road L16	NB	200	18.0%	50
62	Road L16	SB	250	19.0%	50
63	road L7	EB	267	17.5%	50
64	road L7	WB	230	19.0%	50
65	Shing Kai Road	NB	743	14.1%	50
66	Shing Kai Road	SB	1027	11.2%	50
67	Road D2	EB	774	13.2%	50
68	Road D2	WB	1283	9.0%	50
69	Road D2	NB	713	12.0%	50
70	Road D2	SB	1479	9.8%	50
71	Road D2	NB	1265	12.0%	50
72	Road D2	SB	929	9.9%	50
73	Road D2	NB	1474	8.2%	50
74	Road D2	SB	1000	11.0%	50
75	Road L5	NB	50	14.0%	50
76	Road L5	SB	80	14.0%	50
77	Road L6	NB	205	9.8%	50
78	Road L6	SB	100	16.0%	50
79	Road D3	NB	1241	10.2%	50
80	Road D3	SB	876	8.9%	50
81	Road D3	NB	953	10.1%	50
82	Road D3	SB	877	8.9%	50
83	CKR	EB	4527	37.0%	80
84	CKR	WB	4721	38.0%	80
85	Slips Road of CKR	WB	871	40.1%	70
86	Slip Road of Kai Tak Tunnel	SB	740	33.0%	50
87	Shing Cheong Road	SB	2440	35.0%	80
88	Shing Cheong Road	NB	2560	32.0%	80
89	Slip Road of CKR	WB	1340	48.0%	70
90	Slip Road of CKR	EB	1838	24.0%	70
91	Slip Road of CKR	WB	2246	44.0%	70
92	Slip Road of CKR	NB	685	14.9%	70
93	Slip Road of CKR	SB	322	26.8%	70
94	Slip Road of CKR	NB	876	16.0%	70
95	Slip Road of CKR	WB	500	45.0%	70
96	Slip Road of Kai Fuk Road	EB	1100	27.0%	70
97	Slip Road of Kai Fuk Road	WB	1180	32.0%	70
98	Kai Tak Tunnel	EB	2450	22.0%	70
99	Kai Tak Tunnel	WB	2050	31.0%	70
100	Slip Road of Kai Tak Tunnel	EB	1820	22.0%	70
101	Slip Road of CKR	EB	960	34.0%	70
102	Kai Fuk Road	EB	2840	21.0%	70
103	Kai Fuk Road	WB	1440	36.0%	70
104	Kai Fuk Road	WB	3733	34.0%	70
105	Slip Road of CKR	EB	1070	46.0%	70
106	Slip Road of CKR	WB	2273	33.0%	70
107	Slip Road of Kai Tak Tunnel	EB	590	22.0%	70
108	Slip Road of Kai Cheung Road	EB	170	16.0%	50
109	Slip Road of Kai Cheung Road	SB	1000	18.0%	70
110	Slip Road of Kai Fuk Road	WB	620	21.0%	50
111	Slip Road of Kai Cheung Road	EB	760	19.0%	70
112	Slip Road of Kai Cheung Road	WB	1160	17.0%	70
113	Ma Tau Chung Road	NB	3551	32.7%	50
114	Ma Tau Chung Road	SB	1580	42.0%	50
115	Hang Wan Road	EB	1002	15.7%	50
116	Ma Tau Chung Road (at-grade)	NB	1649	38.6%	50

Year 2036 Traffic Forecast for Noise Assessment (With Development)

Road ID	Road Name	Direction	Traffic Flow (veh/hr)	Heavy Vehicles (%)	Speed (Km/h)
117	Ma Tau Chung Road (at grade)	SB	1765	31.6%	50
118	Prince Edward Road West (at grade)	NB	1960	39.0%	50
119	Ma Tau Chung Road (at grade)	SB	1012	39.5%	50
120	Kowloon City Interchange	SB	1105	19.5%	50
121	Argyle Street Roundabout	WB	320	32.0%	50
122	Prince Edward Road West	NB	1650	28.0%	70
123	Prince Edward Road East (f/o)	WB	2370	26.0%	70
124	Prince Edward Road East	EB	1898	28.0%	70
125	Ma Tau Chung Road (f/o)	WB	740	26.0%	70
126	Argyle Street (f/o)	EB	920	36.0%	70
127	Argyle Street (f/o)	WB	560	12.0%	70
128	Prince Edward Road West (at grade)	EB	4550	34.0%	70
129	Prince Edward Road East	EB	4200	36.0%	70
130	Ma Tau Chung Road (at grade)	WB	2327	27.0%	70
131	Kai Tak Flyover	EB	140	15.0%	50
132	Kai Tak Flyover	EB	330	18.0%	50
133	Slip Road of Prince Edward Road East	WB	1350	25.0%	70
134	Slip Road of East Kowloon Corridor	NB	436	13.0%	50
135	Slip Road of Prince Edward Road East	WB	632	19.0%	50
136	Prince Edward Road East (at grade)	EB	4380	35.0%	70
137	Argyle Street Roundabout	EB	2063	30.9%	50
138	Kowloon City Road	NB	550	23.0%	50
139	Kai Tak Tunnel	NB	3340	24.0%	70
140	Kai Tak Tunnel	SB	1310	30.0%	70
141	Shing Kai Road	NB	570	14.0%	50
142	Shing Kai Road	SB	440	11.0%	50
143	Kai Shing Street	WB	980	11.0%	50
144	Kai Shing Street	EB	570	14.0%	50

Appendix 5.3B

**Detailed Calculation Results of
Traffic Noise**

Appendix 5.3B - Detailed Calculation Results of Traffic Noise

Detailed Calculation of Traffic Noise Levels for NSRs (18:00 - 19:00)

NSR	Location	Level	Purpose	Noise Criteria dB(A)	Without MPSC Development dB(A)	With MPSC Development and Event dB(A)	Difference dB(A)	Significant Contribution (>1dB(A))	Remarks
TN1	Sir Robert Block Health Centre	G	Clinic	55	84	84	0.0	N	
TN1	Sir Robert Block Health Centre	1	Clinic	55	84	84	0.0	N	
TN1	Sir Robert Block Health Centre	2	Clinic	55	84	84	0.0	N	
TN2	Lee Kau Yan Memorial School	G	Educational	65	81	81	0.0	N	
TN2	Lee Kau Yan Memorial School	1	Educational	65	81	81	0.0	N	
TN2	Lee Kau Yan Memorial School	2	Educational	65	81	81	0.0	N	
TN2	Lee Kau Yan Memorial School	3	Educational	65	81	81	0.0	N	
TN2	Lee Kau Yan Memorial School	4	Educational	65	81	81	0.0	N	
TN2	Lee Kau Yan Memorial School	5	Educational	65	81	81	0.0	N	
TN2	Lee Kau Yan Memorial School	6	Educational	65	81	81	0.0	N	
TN3	South Masion	1	Residential	70	83	83	0.0	N	
TN3	South Masion	2	Residential	70	83	83	0.0	N	
TN3	South Masion	3	Residential	70	83	83	0.0	N	
TN3	South Masion	4	Residential	70	83	83	0.0	N	
TN3	South Masion	5	Residential	70	83	83	0.0	N	
TN4	Jenford Building	1	Residential	70	84	84	0.0	N	
TN4	Jenford Building	2	Residential	70	86	86	0.0	N	
TN4	Jenford Building	3	Residential	70	86	86	0.0	N	
TN5	Holy Trinity Church	G	Place of Public Worship	65	83	83	0.2	N	
TN5	Holy Trinity Church	1	Place of Public Worship	65	83	83	0.2	N	
TN5	Holy Trinity Church	2	Place of Public Worship	65	83	83	0.2	N	
TN6	Parc 22	1	Residential	70	82	82	0.4	N	
TN6	Parc 22	2	Residential	70	82	82	0.4	N	
TN6	Parc 22	3	Residential	70	81	82	0.4	N	
TN6	Parc 22	4	Residential	70	81	81	0.4	N	
TN6	Parc 22	5	Residential	70	80	81	0.4	N	
TN6	Parc 22	6	Residential	70	80	80	0.4	N	
TN6	Parc 22	7	Residential	70	80	80	0.3	N	
TN6	Parc 22	8	Residential	70	79	80	0.3	N	
TN6	Parc 22	9	Residential	70	79	79	0.3	N	
TN6	Parc 22	10	Residential	70	79	79	0.3	N	
TN6	Parc 22	11	Residential	70	78	79	0.3	N	
TN7	Sky Tower	1	Residential	70	73	73	0.4	N	
TN7	Sky Tower	2	Residential	70	76	76	0.4	N	
TN7	Sky Tower	3	Residential	70	77	77	0.4	N	
TN7	Sky Tower	4	Residential	70	77	77	0.4	N	
TN7	Sky Tower	5	Residential	70	77	77	0.4	N	
TN7	Sky Tower	6	Residential	70	77	77	0.4	N	
TN7	Sky Tower	7	Residential	70	76	77	0.4	N	
TN7	Sky Tower	8	Residential	70	76	77	0.4	N	
TN7	Sky Tower	9	Residential	70	76	77	0.4	N	
TN7	Sky Tower	10	Residential	70	76	76	0.4	N	
TN7	Sky Tower	11	Residential	70	76	76	0.4	N	
TN7	Sky Tower	12	Residential	70	76	76	0.4	N	
TN7	Sky Tower	13	Residential	70	76	76	0.4	N	
TN7	Sky Tower	14	Residential	70	75	76	0.4	N	
TN7	Sky Tower	15	Residential	70	75	76	0.4	N	
TN7	Sky Tower	16	Residential	70	75	76	0.4	N	
TN7	Sky Tower	17	Residential	70	75	76	0.4	N	
TN7	Sky Tower	18	Residential	70	75	75	0.4	N	
TN7	Sky Tower	19	Residential	70	75	75	0.4	N	
TN7	Sky Tower	20	Residential	70	75	75	0.4	N	
TN7	Sky Tower	21	Residential	70	75	75	0.4	N	
TN7	Sky Tower	22	Residential	70	75	75	0.4	N	
TN7	Sky Tower	23	Residential	70	74	75	0.4	N	
TN7	Sky Tower	24	Residential	70	74	75	0.4	N	
TN7	Sky Tower	25	Residential	70	74	75	0.4	N	
TN7	Sky Tower	26	Residential	70	74	75	0.4	N	
TN7	Sky Tower	27	Residential	70	74	74	0.4	N	
TN7	Sky Tower	28	Residential	70	74	74	0.4	N	
TN7	Sky Tower	29	Residential	70	74	74	0.4	N	
TN7	Sky Tower	30	Residential	70	74	74	0.4	N	
TN7	Sky Tower	31	Residential	70	74	74	0.4	N	
TN7	Sky Tower	32	Residential	70	74	74	0.4	N	
TN7	Sky Tower	33	Residential	70	73	74	0.4	N	
TN7	Sky Tower	34	Residential	70	73	74	0.4	N	
TN7	Sky Tower	35	Residential	70	73	74	0.4	N	
TN7	Sky Tower	36	Residential	70	73	74	0.4	N	
TN7	Sky Tower	37	Residential	70	73	74	0.4	N	
TN7	Sky Tower	38	Residential	70	73	73	0.4	N	
TN7	Sky Tower	39	Residential	70	73	73	0.4	N	
TN7	Sky Tower	40	Residential	70	73	73	0.4	N	
TN7	Sky Tower	41	Residential	70	73	73	0.4	N	
TN7	Sky Tower	42	Residential	70	73	73	0.4	N	
TN7	Sky Tower	43	Residential	70	73	73	0.4	N	
TN7	Sky Tower	44	Residential	70	73	73	0.4	N	
TN7	Sky Tower	45	Residential	70	73	73	0.4	N	
TN7	Sky Tower	46	Residential	70	73	73	0.4	N	
TN7	Sky Tower	47	Residential	70	73	73	0.4	N	
TN7	Sky Tower	48	Residential	70	72	73	0.4	N	
TN7	Sky Tower	49	Residential	70	72	73	0.4	N	
TN7	Sky Tower	50	Residential	70	72	73	0.4	N	
TN7	Sky Tower	51	Residential	70	72	73	0.4	N	
TN7	Sky Tower	52	Residential	70	72	73	0.4	N	
TN8.1	HK Society for Blind Hostel	G	Residential	70	79	80	0.8	N	
TN8.1	HK Society for Blind Hostel	1	Residential	70	79	80	0.8	N	
TN8.1	HK Society for Blind Hostel	2	Residential	70	78	79	0.8	N	
TN8.1	HK Society for Blind Hostel	3	Residential	70	77	78	0.8	N	
TN8.1	HK Society for Blind Hostel	4	Residential	70	77	77	0.8	N	
TN8.1	HK Society for Blind Hostel	5	Residential	70	76	77	0.8	N	
TN8.1	HK Society for Blind Hostel	6	Residential	70	75	76	0.8	N	
TN8.1	HK Society for Blind Hostel	7	Residential	70	75	76	0.7	N	
TN8.1	HK Society for Blind Hostel	8	Residential	70	75	75	0.7	N	
TN8.1	HK Society for Blind Hostel	9	Residential	70	74	75	0.7	N	
TN8.1	HK Society for Blind Hostel	10	Residential	70	74	74	0.7	N	
TN8.1	HK Society for Blind Hostel	11	Residential	70	73	74	0.7	N	
TN8.1	HK Society for Blind Hostel	12	Residential	70	73	74	0.7	N	
TN8.1	HK Society for Blind Hostel	13	Residential	70	73	74	0.7	N	

Appendix 5.3B - Detailed Calculation Results of Traffic Noise

NSR	Location	Level	Purpose	Noise Criteria dB(A)	Without MPSC Development dB(A)	With MPSC Development and Event dB(A)	Difference dB(A)	Significant Contribution (>1dB(A))	Remarks
TN8.1	HK Society for Blind Hostel	14	Residential	70	73	73	0.7	N	
TN8.1	HK Society for Blind Hostel	15	Residential	70	73	73	0.7	N	
TN8.1	HK Society for Blind Hostel	16	Residential	70	72	73	0.6	N	
TN8.1	HK Society for Blind Hostel	17	Residential	70	72	73	0.7	N	
TN8.1	HK Society for Blind Hostel	18	Residential	70	71	72	0.6	N	
TN8.1	HK Society for Blind Hostel	19	Residential	70	71	72	0.6	N	
TN8.1	HK Society for Blind Hostel	20	Residential	70	71	71	0.6	N	
TN8.1	HK Society for Blind Hostel	21	Residential	70	71	71	0.6	N	
TN8.2	HK Society for Blind Hostel	6	Residential	70	78	79	0.7	N	
TN8.2	HK Society for Blind Hostel	1	Residential	70	78	78	0.7	N	
TN8.2	HK Society for Blind Hostel	2	Residential	70	77	78	0.7	N	
TN8.2	HK Society for Blind Hostel	3	Residential	70	77	78	0.7	N	
TN8.2	HK Society for Blind Hostel	4	Residential	70	76	77	0.7	N	
TN8.2	HK Society for Blind Hostel	5	Residential	70	76	77	0.7	N	
TN8.2	HK Society for Blind Hostel	6	Residential	70	76	76	0.7	N	
TN8.2	HK Society for Blind Hostel	7	Residential	70	75	76	0.7	N	
TN8.2	HK Society for Blind Hostel	8	Residential	70	75	76	0.7	N	
TN8.2	HK Society for Blind Hostel	9	Residential	70	74	75	0.7	N	
TN8.2	HK Society for Blind Hostel	10	Residential	70	74	75	0.6	N	
TN8.2	HK Society for Blind Hostel	11	Residential	70	74	75	0.6	N	
TN8.2	HK Society for Blind Hostel	12	Residential	70	74	74	0.6	N	
TN8.2	HK Society for Blind Hostel	13	Residential	70	74	74	0.6	N	
TN8.2	HK Society for Blind Hostel	14	Residential	70	73	74	0.6	N	
TN8.2	HK Society for Blind Hostel	15	Residential	70	73	74	0.6	N	
TN8.2	HK Society for Blind Hostel	16	Residential	70	73	73	0.6	N	
TN8.2	HK Society for Blind Hostel	17	Residential	70	73	73	0.6	N	
TN8.2	HK Society for Blind Hostel	18	Residential	70	73	73	0.6	N	
TN8.2	HK Society for Blind Hostel	19	Residential	70	72	73	0.6	N	
TN8.2	HK Society for Blind Hostel	20	Residential	70	72	73	0.6	N	
TN8.2	HK Society for Blind Hostel	21	Residential	70	72	73	0.6	N	
TN9	Ma Tou Kok 13 Streets	1	Residential	70	80	81	0.4	N	
TN9	Ma Tou Kok 13 Streets	2	Residential	70	80	80	0.4	N	
TN9	Ma Tou Kok 13 Streets	3	Residential	70	79	80	0.4	N	
TN9	Ma Tou Kok 13 Streets	4	Residential	70	79	79	0.3	N	
TN10	Grand Waterfront	1	Residential	70	79	79	0.2	N	
TN10	Grand Waterfront	2	Residential	70	79	79	0.2	N	
TN10	Grand Waterfront	3	Residential	70	78	79	0.2	N	
TN10	Grand Waterfront	4	Residential	70	78	78	0.2	N	
TN10	Grand Waterfront	5	Residential	70	78	78	0.2	N	
TN10	Grand Waterfront	6	Residential	70	78	78	0.2	N	
TN10	Grand Waterfront	7	Residential	70	77	77	0.2	N	
TN10	Grand Waterfront	8	Residential	70	77	77	0.2	N	
TN10	Grand Waterfront	9	Residential	70	77	77	0.2	N	
TN10	Grand Waterfront	10	Residential	70	77	77	0.2	N	
TN10	Grand Waterfront	11	Residential	70	76	76	0.2	N	
TN10	Grand Waterfront	12	Residential	70	76	76	0.2	N	
TN10	Grand Waterfront	13	Residential	70	76	76	0.2	N	
TN10	Grand Waterfront	14	Residential	70	76	76	0.2	N	
TN10	Grand Waterfront	15	Residential	70	75	75	0.2	N	
TN10	Grand Waterfront	16	Residential	70	75	75	0.2	N	
TN10	Grand Waterfront	17	Residential	70	75	75	0.2	N	
TN10	Grand Waterfront	18	Residential	70	75	75	0.2	N	
TN10	Grand Waterfront	19	Residential	70	75	75	0.2	N	
TN10	Grand Waterfront	20	Residential	70	75	75	0.1	N	
TN10	Grand Waterfront	21	Residential	70	74	75	0.2	N	
TN10	Grand Waterfront	22	Residential	70	74	74	0.2	N	
TN10	Grand Waterfront	23	Residential	70	74	74	0.2	N	
TN10	Grand Waterfront	24	Residential	70	74	74	0.2	N	
TN10	Grand Waterfront	25	Residential	70	74	74	0.1	N	
TN10	Grand Waterfront	26	Residential	70	74	74	0.2	N	
TN10	Grand Waterfront	27	Residential	70	74	74	0.1	N	
TN10	Grand Waterfront	28	Residential	70	74	74	0.1	N	
TN10	Grand Waterfront	29	Residential	70	73	74	0.1	N	
TN10	Grand Waterfront	30	Residential	70	73	74	0.1	N	
TN10	Grand Waterfront	31	Residential	70	73	73	0.2	N	
TN10	Grand Waterfront	32	Residential	70	73	73	0.1	N	
TN10	Grand Waterfront	33	Residential	70	73	73	0.1	N	
TN10	Grand Waterfront	34	Residential	70	73	73	0.1	N	
TN10	Grand Waterfront	35	Residential	70	73	73	0.1	N	
TN10	Grand Waterfront	36	Residential	70	73	73	0.1	N	
TN10	Grand Waterfront	37	Residential	70	73	73	0.1	N	
TN10	Grand Waterfront	38	Residential	70	73	73	0.1	N	
TN10	Grand Waterfront	39	Residential	70	73	73	0.1	N	
TN10	Grand Waterfront	40	Residential	70	72	73	0.1	N	
TN10	Grand Waterfront	41	Residential	70	72	73	0.1	N	
TN10	Grand Waterfront	42	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	43	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	44	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	45	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	46	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	47	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	48	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	49	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	50	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	51	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	52	Residential	70	72	72	0.1	N	
TN10	Grand Waterfront	53	Residential	70	71	72	0.1	N	
TN10	Grand Waterfront	54	Residential	70	71	72	0.1	N	
TN10	Grand Waterfront	55	Residential	70	71	71	0.1	N	
TN10	Grand Waterfront	56	Residential	70	71	71	0.1	N	
TN10	Grand Waterfront	57	Residential	70	71	71	0.1	N	
TN10	Grand Waterfront	58	Residential	70	71	71	0.1	N	
TN11	Kam Tong Building	1	Residential	70	77	77	0.1	N	
TN11	Kam Tong Building	2	Residential	70	76	76	0.1	N	
TN11	Kam Tong Building	3	Residential	70	75	76	0.1	N	
TN11	Kam Tong Building	4	Residential	70	75	75	0.1	N	
TN11	Kam Tong Building	5	Residential	70	74	74	0.1	N	
TN11	Kam Tong Building	6	Residential	70	74	74	0.1	N	
TN11	Kam Tong Building	7	Residential	70	73	73	0.1	N	
TN11	Kam Tong Building	8	Residential	70	73	73	0.1	N	

Appendix 5.3B - Detailed Calculation Results of Traffic Noise

NSR	Location	Level	Purpose	Noise Criteria dB(A)	Without MPSC Development dB(A)	With MPSC Development and Event dB(A)	Difference dB(A)	Significant Contribution (>1dB(A))	Remarks
TN11	Kam Tong Building	9	Residential	70	72	72	0.1	N	
TN11	Kam Tong Building	10	Residential	70	72	72	0.1	N	
TN11	Kam Tong Building	11	Residential	70	72	72	0.1	N	
TN12	Kowloon City Road No. 183	1	Residential	70	78	78	0.2	N	
TN12	Kowloon City Road No. 183	2	Residential	70	77	77	0.2	N	
TN12	Kowloon City Road No. 183	3	Residential	70	76	77	0.2	N	
TN12	Kowloon City Road No. 183	4	Residential	70	76	76	0.2	N	
TN13	Ma Tou Kok 13 Streets	1	Residential	70	78	79	0.8	N	
TN13	Ma Tou Kok 13 Streets	2	Residential	70	77	78	0.8	N	
TN13	Ma Tou Kok 13 Streets	3	Residential	70	76	77	0.8	N	
TN13	Ma Tou Kok 13 Streets	4	Residential	70	75	76	0.8	N	
TN13	Ma Tou Kok 13 Streets	5	Residential	70	75	76	0.8	N	
TN13	Ma Tou Kok 13 Streets	6	Residential	70	74	75	0.8	N	
TN13	Ma Tou Kok 13 Streets	7	Residential	70	74	74	0.8	N	
TN14	Ma Tou Kok 13 Streets	1	Residential	70	78	78	0.6	N	
TN14	Ma Tou Kok 13 Streets	2	Residential	70	77	78	0.6	N	
TN14	Ma Tou Kok 13 Streets	3	Residential	70	77	78	0.6	N	
TN14	Ma Tou Kok 13 Streets	4	Residential	70	77	77	0.6	N	
TN14	Ma Tou Kok 13 Streets	5	Residential	70	76	77	0.6	N	
TN14	Ma Tou Kok 13 Streets	6	Residential	70	76	76	0.6	N	
TN14	Ma Tou Kok 13 Streets	7	Residential	70	76	76	0.6	N	
TN15	Po Sing Mansion	1	Residential	70	81	81	0.2	N	
TN15	Po Sing Mansion	2	Residential	70	81	81	0.2	N	
TN15	Po Sing Mansion	3	Residential	70	81	81	0.2	N	
TN15	Po Sing Mansion	4	Residential	70	80	80	0.1	N	
TN15	Po Sing Mansion	5	Residential	70	80	80	0.1	N	
TN15	Po Sing Mansion	6	Residential	70	80	80	0.1	N	
TN15	Po Sing Mansion	7	Residential	70	80	80	0.1	N	
TN15	Po Sing Mansion	8	Residential	70	79	79	0.1	N	
TN15	Po Sing Mansion	9	Residential	70	79	79	0.1	N	
TN15	Po Sing Mansion	10	Residential	70	79	79	0.1	N	
TN15	Po Sing Mansion	11	Residential	70	79	79	0.1	N	
TN15	Po Sing Mansion	12	Residential	70	78	79	0.1	N	
TN16	The Latitude	1	Residential	70	82	82	0.0	N	
TN16	The Latitude	2	Residential	70	82	82	0.0	N	
TN16	The Latitude	3	Residential	70	81	81	0.0	N	
TN16	The Latitude	4	Residential	70	81	81	0.0	N	
TN16	The Latitude	5	Residential	70	81	81	0.0	N	
TN16	The Latitude	6	Residential	70	81	81	0.0	N	
TN16	The Latitude	7	Residential	70	81	81	0.0	N	
TN16	The Latitude	8	Residential	70	80	80	0.0	N	
TN16	The Latitude	9	Residential	70	80	80	0.0	N	
TN16	The Latitude	10	Residential	70	80	80	0.0	N	
TN16	The Latitude	11	Residential	70	80	80	0.0	N	
TN16	The Latitude	12	Residential	70	80	80	0.0	N	
TN16	The Latitude	13	Residential	70	80	80	0.0	N	
TN16	The Latitude	14	Residential	70	79	80	0.0	N	
TN16	The Latitude	15	Residential	70	79	79	0.0	N	
TN16	The Latitude	16	Residential	70	79	79	0.0	N	
TN16	The Latitude	17	Residential	70	79	79	0.0	N	
TN16	The Latitude	18	Residential	70	79	79	0.0	N	
TN16	The Latitude	19	Residential	70	79	79	0.0	N	
TN16	The Latitude	20	Residential	70	79	79	0.0	N	
TN16	The Latitude	21	Residential	70	79	79	0.0	N	
TN16	The Latitude	22	Residential	70	78	78	0.0	N	
TN16	The Latitude	23	Residential	70	78	78	0.0	N	
TN16	The Latitude	24	Residential	70	78	78	0.0	N	
TN16	The Latitude	25	Residential	70	78	78	0.0	N	
TN16	The Latitude	26	Residential	70	78	78	0.0	N	
TN16	The Latitude	27	Residential	70	78	78	0.0	N	
TN16	The Latitude	28	Residential	70	78	78	0.0	N	
TN16	The Latitude	29	Residential	70	78	78	0.0	N	
TN16	The Latitude	30	Residential	70	78	78	0.0	N	
TN16	The Latitude	31	Government	70	77	78	0.0	N	
TN16	The Latitude	32	Government	70	77	77	0.0	N	
TN16	The Latitude	33	Government	70	77	77	0.0	N	
TN16	The Latitude	34	Government	70	77	77	0.0	N	
TN16	The Latitude	35	Government	70	77	77	0.0	N	
TN16	The Latitude	36	Government	70	77	77	0.0	N	
TN16	The Latitude	37	Government	70	77	77	0.0	N	
TN16	The Latitude	38	Government	70	77	77	0.0	N	
TN16	The Latitude	39	Government	70	77	77	0.0	N	
TN16	The Latitude	40	Government	70	77	77	0.0	N	
TN16	The Latitude	41	Government	70	77	77	0.0	N	
TN16	The Latitude	42	Government	70	77	77	0.0	N	
TN16	The Latitude	43	Government	70	76	77	0.0	N	
TN16	The Latitude	44	Government	70	76	76	0.0	N	
TN16	The Latitude	45	Government	70	76	76	0.0	N	
TN16	The Latitude	46	Government	70	76	76	0.0	N	
TN16	The Latitude	47	Government	70	76	76	0.0	N	
TN16	The Latitude	48	Government	70	76	76	0.0	N	
TN16	The Latitude	49	Commercial	70	76	76	0.0	N	
TN17	Trade and Industry Tower with Community Hall	1	Commercial	70	70	70	0.0	N	
TN17	Trade and Industry Tower with Community Hall	2	Commercial	70	74	74	0.0	N	
TN17	Trade and Industry Tower with Community Hall	3	Commercial	70	76	76	0.0	N	
TN17	Trade and Industry Tower with Community Hall	4	Commercial	70	76	76	0.0	N	
TN17	Trade and Industry Tower with Community Hall	5	Commercial	70	77	77	0.0	N	
TN17	Trade and Industry Tower with Community Hall	6	Commercial	70	77	77	0.0	N	
TN17	Trade and Industry Tower with Community Hall	7	Commercial	70	77	77	0.0	N	
TN17	Trade and Industry Tower with Community Hall	8	Commercial	70	77	77	0.0	N	
TN17	Trade and Industry Tower with Community Hall	9	Commercial	70	77	77	0.0	N	
TN17	Trade and Industry Tower with Community Hall	10	Commercial	70	77	77	0.0	N	
TN17	Trade and Industry Tower with Community Hall	11	Commercial	70	77	77	0.1	N	
TN17	Trade and Industry Tower with Community Hall	12	Commercial	70	77	77	0.1	N	
TN17	Trade and Industry Tower with Community Hall	13	Commercial	70	77	77	0.1	N	
TN17	Trade and Industry Tower with Community Hall	14	Commercial	70	77	77	0.1	N	
TN17	Trade and Industry Tower with Community Hall	15	Commercial	70	77	77	0.1	N	
TN17	Trade and Industry Tower with Community Hall	16	Commercial	70	77	77	0.1	N	
TN17	Trade and Industry Tower with Community Hall	17	Commercial	70	77	77	0.1	N	
TN17	Trade and Industry Tower with Community Hall	18	Commercial	70	77	77	0.1	N	

Appendix 5.3B - Detailed Calculation Results of Traffic Noise

NSR	Location	Level	Purpose	Noise Criteria dB(A)	Without MPSC Development dB(A)	With MPSC Development and Event dB(A)	Difference dB(A)	Significant Contribution (>1dB(A))	Remarks
TPN9	Site 2A4	9	Commercial with sensitive uses	70	81	81	0.1	N	
TPN9	Site 2A4	10	Commercial with sensitive uses	70	81	81	0.1	N	
TPN9	Site 2A4	11	Commercial with sensitive uses	70	81	81	0.1	N	
TPN9	Site 2A4	12	Commercial with sensitive uses	70	81	81	0.1	N	
TPN9	Site 2A4	13	Commercial with sensitive uses	70	81	81	0.1	N	
TPN9	Site 2A4	14	Commercial with sensitive uses	70	81	81	0.1	N	
TPN9	Site 2A4	15	Commercial with sensitive uses	70	80	81	0.1	N	
TPN9	Site 2A4	16	Commercial with sensitive uses	70	80	80	0.1	N	
TPN9	Site 2A4	17	Commercial with sensitive uses	70	80	80	0.1	N	
TPN9	Site 2A4	18	Commercial with sensitive uses	70	80	80	0.1	N	
TPN9	Site 2A4	19	Commercial with sensitive uses	70	80	80	0.1	N	
TPN9	Site 2A4	20	Commercial with sensitive uses	70	80	80	0.1	N	
TPN9	Site 2A4	21	Commercial with sensitive uses	70	80	80	0.1	N	
TPN9	Site 2A4	22	Commercial with sensitive uses	70	80	80	0.0	N	
TPN9	Site 2A4	23	Commercial with sensitive uses	70	80	80	0.1	N	
TPN9	Site 2A4	24	Commercial with sensitive uses	70	80	80	0.1	N	
TPN10	Site 2A5	6	Commercial with sensitive uses	70	81	81	0.1	N	
TPN10	Site 2A5	1	Commercial with sensitive uses	70	81	81	0.1	N	
TPN10	Site 2A5	2	Commercial with sensitive uses	70	81	81	0.1	N	
TPN10	Site 2A5	3	Commercial with sensitive uses	70	81	81	0.1	N	
TPN10	Site 2A5	4	Commercial with sensitive uses	70	81	81	0.1	N	
TPN10	Site 2A5	5	Commercial with sensitive uses	70	81	81	0.1	N	
TPN10	Site 2A5	6	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	7	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	8	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	9	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	10	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	11	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	12	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	13	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	14	Commercial	70	81	81	0.1	N	
TPN10	Site 2A5	15	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	16	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	17	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	18	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	19	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	20	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	21	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	22	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	23	Commercial	70	80	80	0.1	N	
TPN10	Site 2A5	24	Commercial	70	80	80	0.1	N	
TPN11	Site 2A7	6	Commercial	70	77	77	0.2	N	
TPN11	Site 2A7	1	Commercial	70	77	77	0.2	N	
TPN11	Site 2A7	2	Commercial	70	77	77	0.2	N	
TPN11	Site 2A7	3	Commercial	70	77	77	0.2	N	
TPN11	Site 2A7	4	Commercial	70	76	77	0.2	N	
TPN11	Site 2A7	5	Commercial	70	76	77	0.2	N	
TPN11	Site 2A7	6	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	7	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	8	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	9	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	10	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	11	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	12	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	13	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	14	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	15	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	16	Mixed Use	70	76	76	0.2	N	
TPN11	Site 2A7	17	Mixed Use	70	75	76	0.2	N	
TPN11	Site 2A7	18	Mixed Use	70	75	76	0.2	N	
TPN11	Site 2A7	19	Mixed Use	70	75	76	0.2	N	
TPN11	Site 2A7	20	Mixed Use	70	75	75	0.2	N	
TPN11	Site 2A7	21	Mixed Use	70	75	75	0.2	N	
TPN11	Site 2A7	22	Mixed Use	70	75	75	0.2	N	
TPN11	Site 2A7	23	Mixed Use	70	75	75	0.2	N	
TPN11	Site 2A7	24	Mixed Use	70	75	75	0.2	N	
TPN12	Sung Wong Toi Road CDA Site	1	Mixed Use	70	78	79	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	2	Mixed Use	70	78	79	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	3	Mixed Use	70	77	78	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	4	Mixed Use	70	76	77	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	5	Mixed Use	70	76	77	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	6	Mixed Use	70	75	76	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	7	Mixed Use	70	75	76	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	8	Mixed Use	70	74	75	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	9	Mixed Use	70	74	75	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	10	Mixed Use	70	74	75	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	11	Mixed Use	70	73	74	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	12	Mixed Use	70	73	74	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	13	Mixed Use	70	73	74	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	14	Mixed Use	70	73	74	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	15	Mixed Use	70	72	73	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	16	Mixed Use	70	72	73	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	17	Mixed Use	70	72	73	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	18	Mixed Use	70	72	73	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	19	Mixed Use	70	71	72	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	20	Mixed Use	70	71	72	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	21	Mixed Use	70	71	72	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	22	Mixed Use	70	71	72	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	23	Mixed Use	70	71	72	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	24	Mixed Use	70	71	72	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	25	Mixed Use	70	71	71	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	26	Mixed Use	70	70	71	0.9	N	
TPN12	Sung Wong Toi Road CDA Site	27	Mixed Use	70	70	71	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	28	Mixed Use	70	70	71	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	29	Mixed Use	70	70	71	1.0	Y	
TPN12	Sung Wong Toi Road CDA Site	30	Mixed Use	70	70	71	1.0	Y	
TPN12A	Sung Wong Toi Road CDA Site	1	Mixed Use	70	78	78	0.9	N	
TPN12A	Sung Wong Toi Road CDA Site	2	Mixed Use	70	77	78	0.9	N	
TPN12A	Sung Wong Toi Road CDA Site	3	Mixed Use	70	77	77	0.9	N	
TPN12A	Sung Wong Toi Road CDA Site	4	Mixed Use	70	76	77	0.9	N	

Appendix 5.3B - Detailed Calculation Results of Traffic Noise

NSR	Location	Level	Purpose	Noise Criteria dB(A)	Without MPSC Development dB(A)	With MPSC Development and Event dB(A)	Difference dB(A)	Significant Contribution (>1dB(A))	Remarks
TPN18	Site 3A6	29	Commercial	70	76	76	0.0	N	
TPN18	Site 3A6	30	Commercial	70	76	76	0.0	N	
TPN19	Site 1N1	6	Commercial	70	80	81	0.1	N	
TPN19	Site 1N1	1	Commercial	70	80	81	0.1	N	
TPN19	Site 1N1	2	Commercial	70	80	80	0.1	N	
TPN19	Site 1N1	3	Commercial	70	80	80	0.1	N	
TPN19	Site 1N1	4	Commercial	70	80	80	0.1	N	
TPN19	Site 1N1	5	Commercial	70	80	80	0.1	N	
TPN19	Site 1N1	6	Commercial	70	80	80	0.1	N	
TPN19	Site 1N1	7	Commercial	70	80	80	0.2	N	
TPN19	Site 1N1	8	Commercial	70	79	80	0.2	N	
TPN19	Site 1N1	9	Commercial	70	79	79	0.2	N	
TPN19	Site 1N1	10	Commercial	70	79	79	0.2	N	
TPN19	Site 1N1	11	Commercial	70	79	79	0.2	N	
TPN19	Site 1N1	12	Commercial	70	79	79	0.1	N	
TPN19	Site 1N1	13	Commercial	70	79	79	0.1	N	
TPN19	Site 1N1	14	Commercial	70	79	79	0.2	N	
TPN19	Site 1N1	15	Commercial	70	78	79	0.1	N	
TPN19	Site 1N1	16	Commercial	70	78	78	0.1	N	
TPN19	Site 1N1	17	Commercial	70	78	78	0.1	N	
TPN19	Site 1N1	18	Commercial	70	78	78	0.2	N	
TPN19	Site 1N1	19	Commercial	70	78	78	0.1	N	
TPN19	Site 1N1	20	Commercial	70	78	78	0.1	N	
TPN19	Site 1N1	21	Commercial	70	78	78	0.1	N	
TPN19	Site 1N1	22	Commercial	70	78	78	0.1	N	
TPN19	Site 1N1	23	Commercial	70	78	78	0.1	N	
TPN19	Site 1N1	24	Commercial	70	77	78	0.1	N	
TPN19	Site 1N1	25	Commercial	70	77	78	0.1	N	
TPN19	Site 1N1	26	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	27	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	28	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	29	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	30	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	31	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	32	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	33	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	34	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	35	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	36	Commercial	70	77	77	0.1	N	
TPN19	Site 1N1	37	Commercial	70	77	77	0.1	N	
TPN20	Site 1N1	6	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	1	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	2	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	3	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	4	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	5	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	6	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	7	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	8	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	9	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	10	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	11	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	12	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	13	Commercial	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	14	Residential	70	69	70	1.0	Y	≤70dB
TPN20	Site 1N1	15	Residential	70	69	69	1.0	Y	≤70dB
TPN20	Site 1N1	16	Residential	70	68	69	1.0	Y	≤70dB
TPN20	Site 1N1	17	Residential	70	68	69	1.0	Y	≤70dB
TPN20	Site 1N1	18	Residential	70	68	69	1.0	Y	≤70dB
TPN20	Site 1N1	19	Residential	70	68	69	0.9	N	
TPN20	Site 1N1	20	Residential	70	68	69	1.0	Y	≤70dB
TPN20	Site 1N1	21	Residential	70	68	69	1.0	Y	≤70dB
TPN20	Site 1N1	22	Residential	70	68	69	1.0	Y	≤70dB
TPN20	Site 1N1	23	Residential	70	68	69	1.0	Y	≤70dB
TPN20	Site 1N1	24	Residential	70	68	69	1.0	Y	≤70dB
TPN20	Site 1N1	25	Residential	70	68	68	0.9	N	
TPN20	Site 1N1	26	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	27	Residential	70	67	68	1.0	Y	≤70dB
TPN20	Site 1N1	28	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	29	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	30	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	31	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	32	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	33	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	34	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	35	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	36	Residential	70	67	68	0.9	N	
TPN20	Site 1N1	37	Residential	70	67	67	0.9	N	
TPN21	Site 1K2	6	Residential	70	68	68	0.0	N	
TPN21	Site 1K2	1	Residential	70	67	67	0.0	N	
TPN21	Site 1K2	2	Residential	70	67	67	0.0	N	
TPN21	Site 1K2	3	Residential	70	67	67	0.0	N	
TPN21	Site 1K2	4	Residential	70	67	67	0.0	N	
TPN21	Site 1K2	5	Residential	70	67	67	0.0	N	
TPN21	Site 1K2	6	Residential	70	67	66	-0.1	N	
TPN21	Site 1K2	7	Residential	70	66	66	-0.1	N	
TPN21	Site 1K2	8	Residential	70	66	66	-0.2	N	
TPN21	Site 1K2	9	Residential	70	66	66	-0.2	N	
TPN21	Site 1K2	10	Residential	70	66	65	-0.3	N	
TPN21	Site 1K2	11	Residential	70	65	65	-0.3	N	
TPN21	Site 1K2	12	Residential	70	65	65	-0.4	N	
TPN21	Site 1K2	13	Residential	70	65	65	-0.4	N	
TPN21	Site 1K2	14	Residential	70	65	65	-0.5	N	
TPN21	Site 1K2	15	Residential	70	65	64	-0.5	N	
TPN21	Site 1K2	16	Residential	70	65	64	-0.6	N	
TPN21	Site 1K2	17	Residential	70	65	64	-0.6	N	
TPN21	Site 1K2	18	Residential	70	64	64	-0.7	N	
TPN21	Site 1K2	19	Residential	70	64	64	-0.7	N	
TPN21	Site 1K2	20	Residential	70	64	64	-0.7	N	
TPN21	Site 1K2	21	Residential	70	64	63	-0.8	N	

Appendix 5.3B - Detailed Calculation Results of Traffic Noise

NSR	Location	Level	Purpose	Noise Criteria dB(A)	Without MPSC Development dB(A)	With MPSC Development and Event dB(A)	Difference dB(A)	Significant Contribution (>1dB(A))	Remarks
TPN21	Site 1K2	22	Residential	70	64	63	-0.8	N	
TPN21	Site 1K2	23	Residential	70	64	63	-0.8	N	
TPN21	Site 1K2	24	Residential	70	64	63	-0.8	N	
TPN21	Site 1K2	25	Residential	70	64	63	-0.9	N	
TPN21	Site 1K2	26	Residential	70	64	63	-0.9	N	
TPN21	Site 1K2	27	Residential	70	64	63	-0.9	N	
TPN21	Site 1K2	28	Residential	70	64	63	-0.9	N	
TPN21	Site 1K2	29	Residential	70	64	63	-1.0	N	
TPN21	Site 1K2	30	Residential	70	63	62	-1.0	N	
TPN21	Site 1K2	31	Residential	70	63	62	-1.0	N	
TPN21	Site 1K2	32	Residential	70	63	62	-1.0	N	
TPN21	Site 1K2	33	Residential	70	63	62	-1.1	N	
TPN21	Site 1K2	34	Residential	70	63	62	-1.1	N	
TPN21	Site 1K2	35	Residential	70	63	62	-1.1	N	
TPN21	Site 1K2	36	Residential	70	63	62	-1.1	N	
TPN21	Site 1K2	37	Residential	70	63	62	-1.1	N	
TPN21	Site 1K2	38	Residential	70	63	62	-1.1	N	
TPN21	Site 1K2	39	Residential	70	63	62	-1.1	N	
TPN21	Site 1K2	40	Residential	70	63	62	-1.2	N	
TPN22	Site 1L3	G	Residential	70	67	68	0.6	N	
TPN22	Site 1L3	1	Residential	70	67	68	0.6	N	
TPN22	Site 1L3	2	Residential	70	67	68	0.6	N	
TPN22	Site 1L3	3	Residential	70	67	67	0.6	N	
TPN22	Site 1L3	4	Residential	70	67	67	0.6	N	
TPN22	Site 1L3	5	Residential	70	66	67	0.6	N	
TPN22	Site 1L3	6	Residential	70	66	66	0.5	N	
TPN22	Site 1L3	7	Residential	70	66	66	0.5	N	
TPN22	Site 1L3	8	Residential	70	65	66	0.5	N	
TPN22	Site 1L3	9	Residential	70	65	66	0.5	N	
TPN22	Site 1L3	10	Residential	70	65	65	0.4	N	
TPN22	Site 1L3	11	Residential	70	65	65	0.4	N	
TPN22	Site 1L3	12	Residential	70	64	65	0.4	N	
TPN22	Site 1L3	13	Residential	70	64	64	0.4	N	
TPN22	Site 1L3	14	Residential	70	64	64	0.4	N	
TPN22	Site 1L3	15	Residential	70	64	64	0.4	N	
TPN22	Site 1L3	16	Residential	70	63	64	0.3	N	
TPN22	Site 1L3	17	Residential	70	63	64	0.3	N	
TPN22	Site 1L3	18	Residential	70	63	63	0.3	N	
TPN22	Site 1L3	19	Residential	70	63	63	0.3	N	
TPN22	Site 1L3	20	Residential	70	63	63	0.3	N	
TPN22	Site 1L3	21	Residential	70	63	63	0.3	N	
TPN22	Site 1L3	22	Residential	70	62	63	0.3	N	
TPN22	Site 1L3	23	Residential	70	62	62	0.2	N	
TPN22	Site 1L3	24	Residential	70	62	62	0.2	N	
TPN22	Site 1L3	25	Residential	70	62	62	0.2	N	
TPN22	Site 1L3	26	Residential	70	62	62	0.2	N	
TPN22	Site 1L3	27	Residential	70	62	62	0.2	N	
TPN22	Site 1L3	28	Residential	70	62	62	0.2	N	
TPN22	Site 1L3	29	Residential	70	61	62	0.2	N	
TPN22	Site 1L3	30	Residential	70	61	62	0.2	N	
TPN22	Site 1L3	31	Residential	70	61	61	0.1	N	
TPN22	Site 1L3	32	Residential	70	61	61	0.1	N	
TPN22	Site 1L3	33	Residential	70	61	61	0.1	N	
TPN22	Site 1L3	34	Residential	70	61	61	0.1	N	
TPN22	Site 1L3	35	Residential	70	61	61	0.1	N	
TPN22	Site 1L3	36	Residential	70	61	61	0.1	N	
TPN22	Site 1L3	37	Residential	70	61	61	0.1	N	
TPN23	Site 1L3	G	Residential	70	68	68	0.7	N	
TPN23	Site 1L3	1	Residential	70	68	68	0.7	N	
TPN23	Site 1L3	2	Residential	70	68	69	0.7	N	
TPN23	Site 1L3	3	Residential	70	68	69	0.7	N	
TPN23	Site 1L3	4	Residential	70	68	69	0.7	N	
TPN23	Site 1L3	5	Residential	70	68	69	0.7	N	
TPN23	Site 1L3	6	Residential	70	68	69	0.8	N	
TPN23	Site 1L3	7	Residential	70	68	69	0.8	N	
TPN23	Site 1L3	8	Residential	70	69	69	0.8	N	
TPN23	Site 1L3	9	Residential	70	69	69	0.8	N	
TPN23	Site 1L3	10	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	11	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	12	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	13	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	14	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	15	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	16	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	17	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	18	Residential	70	69	70	0.8	N	
TPN23	Site 1L3	19	Residential	70	69	70	0.7	N	
TPN23	Site 1L3	20	Residential	70	69	70	0.7	N	
TPN23	Site 1L3	21	Residential	70	69	70	0.7	N	
TPN23	Site 1L3	22	Residential	70	69	70	0.7	N	
TPN23	Site 1L3	23	Residential	70	69	70	0.7	N	
TPN23	Site 1L3	24	Residential	70	69	70	0.7	N	
TPN23	Site 1L3	25	Residential	70	69	70	0.7	N	
TPN23	Site 1L3	26	Residential	70	69	70	0.7	N	
TPN23	Site 1L3	27	Residential	70	69	70	0.6	N	
TPN23	Site 1L3	28	Residential	70	69	70	0.6	N	
TPN23	Site 1L3	29	Residential	70	69	70	0.6	N	
TPN23	Site 1L3	30	Residential	70	69	70	0.6	N	
TPN23	Site 1L3	31	Residential	70	69	70	0.6	N	
TPN23	Site 1L3	32	Residential	70	69	70	0.6	N	
TPN23	Site 1L3	33	Residential	70	69	69	0.6	N	
TPN23	Site 1L3	34	Residential	70	69	69	0.6	N	
TPN23	Site 1L3	35	Residential	70	69	69	0.6	N	
TPN23	Site 1L3	36	Residential	70	69	69	0.6	N	
TPN23	Site 1L3	37	Residential	70	69	69	0.6	N	
TPN24	Site 1L2	G	Residential	70	64	65	1.6	Y	≤70dB
TPN24	Site 1L2	1	Residential	70	64	65	1.6	Y	≤70dB
TPN24	Site 1L2	2	Residential	70	64	65	1.6	Y	≤70dB
TPN24	Site 1L2	3	Residential	70	64	65	1.6	Y	≤70dB
TPN24	Site 1L2	4	Residential	70	64	65	1.6	Y	≤70dB

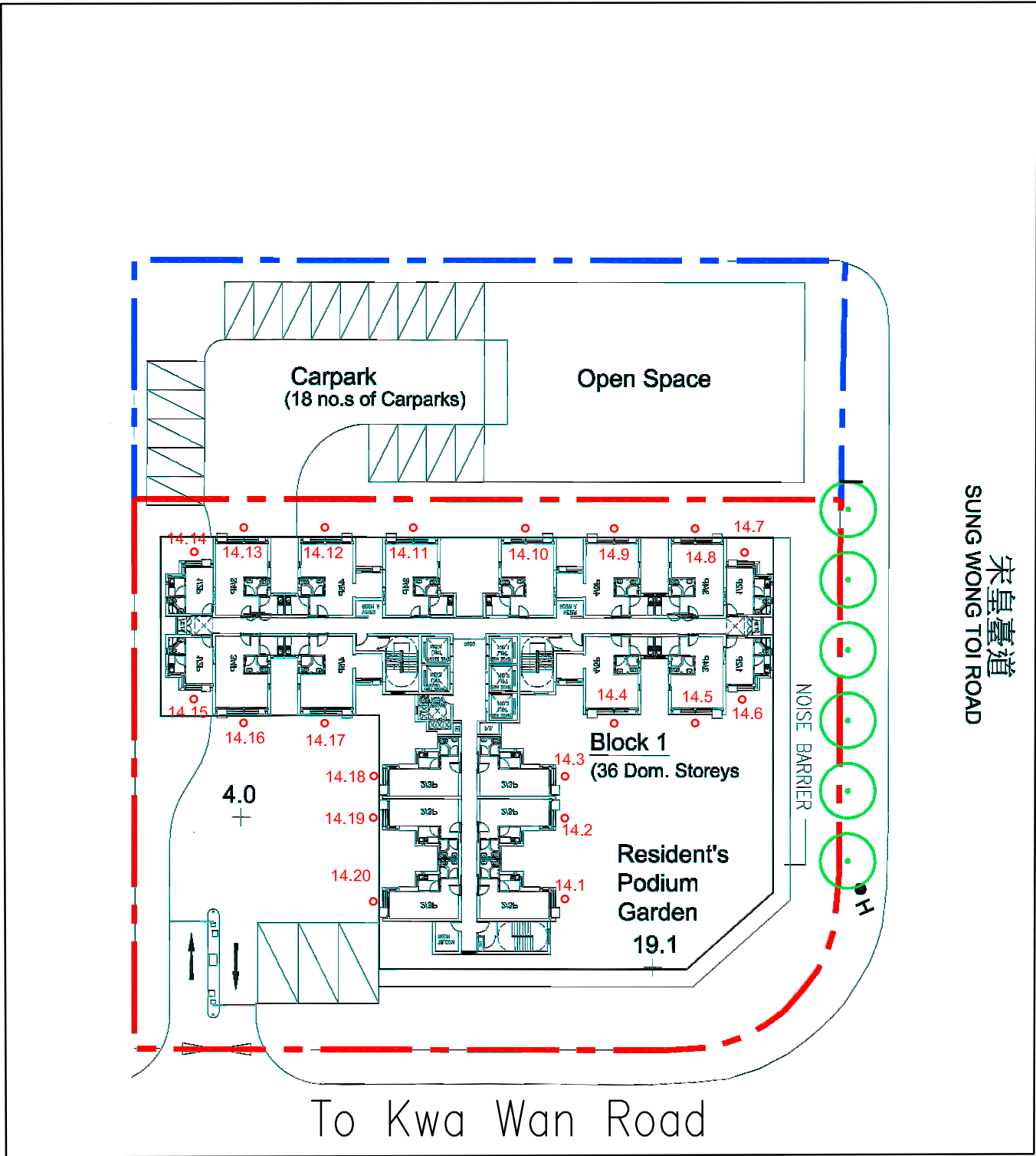
Appendix 5.3B - Detailed Calculation Results of Traffic Noise

NSR	Location	Level	Purpose	Noise Criteria dB(A)	Without MPSC Development dB(A)	With MPSC Development and Event dB(A)	Difference dB(A)	Significant Contribution (>1dB(A))	Remarks
TPN24	Site 1L2	5	Residential	70	64	65	1.6	Y	≤70dB
TPN24	Site 1L2	6	Residential	70	64	65	1.5	Y	≤70dB
TPN24	Site 1L2	7	Residential	70	64	66	1.5	Y	≤70dB
TPN24	Site 1L2	8	Residential	70	65	66	1.4	Y	≤70dB
TPN24	Site 1L2	9	Residential	70	66	67	1.1	Y	≤70dB
TPN24	Site 1L2	10	Residential	70	68	69	0.8	N	
TPN24	Site 1L2	11	Residential	70	69	70	0.6	N	
TPN24	Site 1L2	12	Residential	70	70	70	0.6	N	
TPN24	Site 1L2	13	Residential	70	70	71	0.6	N	
TPN24	Site 1L2	14	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	15	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	16	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	17	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	18	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	19	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	20	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	21	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	22	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	23	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	24	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	25	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	26	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	27	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	28	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	29	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	30	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	31	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	32	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	33	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	34	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	35	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	36	Residential	70	70	71	0.7	N	
TPN24	Site 1L2	37	Residential	70	70	71	0.7	N	
TPN25	Site 1I3	G	Residential	70	56	58	1.5	Y	≤70dB
TPN25	Site 1I3	1	Residential	70	56	58	1.5	Y	≤70dB
TPN25	Site 1I3	2	Residential	70	56	58	1.4	Y	≤70dB
TPN25	Site 1I3	3	Residential	70	56	58	1.4	Y	≤70dB
TPN25	Site 1I3	4	Residential	70	57	58	1.4	Y	≤70dB
TPN25	Site 1I3	5	Residential	70	57	59	1.3	Y	≤70dB
TPN25	Site 1I3	6	Residential	70	58	59	1.2	Y	≤70dB
TPN25	Site 1I3	7	Residential	70	59	60	1.1	Y	≤70dB
TPN25	Site 1I3	8	Residential	70	60	61	0.9	N	
TPN25	Site 1I3	9	Residential	70	61	62	0.8	N	
TPN25	Site 1I3	10	Residential	70	62	63	0.7	N	
TPN25	Site 1I3	11	Residential	70	64	64	0.6	N	
TPN25	Site 1I3	12	Residential	70	65	65	0.6	N	
TPN25	Site 1I3	13	Residential	70	65	66	0.6	N	
TPN25	Site 1I3	14	Residential	70	65	66	0.6	N	
TPN25	Site 1I3	15	Residential	70	66	66	0.6	N	
TPN25	Site 1I3	16	Residential	70	66	67	0.7	N	
TPN25	Site 1I3	17	Residential	70	66	67	0.7	N	
TPN25	Site 1I3	18	Residential	70	66	67	0.7	N	
TPN25	Site 1I3	19	Residential	70	66	67	0.7	N	
TPN25	Site 1I3	20	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	21	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	22	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	23	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	24	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	25	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	26	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	27	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	28	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	29	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	30	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	31	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	32	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	33	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	34	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	35	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	36	Residential	70	67	67	0.7	N	
TPN25	Site 1I3	37	Residential	70	67	67	0.7	N	
TPN26	Site 1B4	1	Education	65	71	71	0.5	N	
TPN26	Site 1B4	2	Education	65	71	71	0.5	N	
TPN26	Site 1B4	3	Education	65	71	71	0.5	N	
TPN26	Site 1B4	4	Education	65	71	71	0.5	N	
TPN26	Site 1B4	5	Education	65	71	71	0.5	N	
TPN26	Site 1B4	6	Education	65	70	71	0.5	N	

Appendix 5.3C

Detailed Location of NSR TPN14

Detailed Location of NSRs 14.1–14.20



Appendix 5.3D

**Traffic Forecast Endorsement by Transport
Department**



運輸署

Transport Department

本署檔號 Our Ref. KR 182/112-46
 來函檔號 Your Ref. CHK50018810/LYT/L1501199/jch
 電話 Tel. 2399 2510
 圖文傳真 Fax 2397 8046

By fax: 2527 8490

Total page: 1

24 August 2015

CHK50018810		
Date in	0321174	
Initials	As on Date	Copy Date
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DICI		
Applicate	Filing Clerk	Day File
		25/8
Reply Ref.		
Reply Date		
By		

MVA Hong Kong Ltd
 14/F West, Warwick House,
 Taikoo Place, 979 King's Road,
 Island East, Hong Kong
 (Attn: Mr. Steven Ho)

Dear Sir,

Consultancy Agreement No. 50B112
Consultancy Services to Carry out Environmental Impact Assessment and Traffic Impact Assessment Studies for the Multi-Purpose Sports Complex at Kai Tak Area
Technical Note of Traffic Forecast for Environmental Impact Assessment

I have no further comment on your Technical Note of Traffic Forecast for Environmental Impact Assessment.

Yours faithfully,

(Wendy W T TANG)
 for Commissioner for Transport

市區(九龍)及新界分區辦事處
 Urban (Kln.) & NT Regional Offices
 九龍聯運街三十號旺角政府合署七樓及八樓
 7th & 8th Floors, Mong Kok Government Offices, 30 Luen Wan Street, Kowloon.
 圖文傳真 Fax No.: 2381 3799 (新界區) (NTRO) 2397 8046 (九龍市區) (U(K)RO)
 網址 Web Site: <http://www.td.gov.hk>

Appendix 5.4A

**Noise Assessment for Main Stadium Fixed
Noise and Music, Singing and Instrument
Performing Activities**

Table 1 *Predicted noise level during a sporty event*

NSR	Height, mPD	Result, dB(A), Leq (30 min)	NSR	Height, mPD	Result, dB(A), Leq (30 min)
N1	10	23	PN4	30	28
N1	20	23	PN4	50	36
N2	10	23	PN4	70	41
N2	30	28	PN4	90	45
N2	50	34	PN5	10	28
N2	70	39	PN5	30	28
N2	90	43	PN5	50	41
N2	110	46	PN5	70	46
N2	130	48	PN5	90	48
N2	150	48	PN6	10	25
PN1	15	24	PN6	30	29
PN1	35	27	PN6	50	42
PN1	55	42	PN6	70	45
PN2A	30	30	PN6	90	51
PN2A	50	33	PN7	10	28
PN2A	70	46	PN7	30	36
PN2A	90	53	PN7	50	40
PN2A	110	55	PN7	70	44
PN2B	30	35	PN7	90	47
PN2B	50	39	PN7	110	50
PN2B	70	46	PN8	10	32
PN2B	90	52	PN8	30	38
PN2B	110	54	PN8	50	41
PN3	10	25	PN8	70	47
PN3	30	31	PN8	90	51
PN3	50	39	PN8	110	53
PN3	70	43	PN9	10	27
PN3	90	48	PN9	25	27
PN4	10	24	PN9	40	30

Table 2 *Predicted noise level for Concert Setting 1*

NSR	Height, mPD	Result, dB(A), Leq (15 min)	NSR	Height, mPD	Result, dB(A), Leq (15 min)
N1	10	36	PN4	30	40
N1	20	37	PN4	50	47
N2	10	43	PN4	70	51
N2	30	44	PN4	90	57
N2	50	45	PN5	10	36
N2	70	50	PN5	30	38
N2	90	55	PN5	50	53
N2	110	57	PN5	70	57
N2	130	58	PN5	90	59
N2	150	59	PN6	10	36
PN1	15	37	PN6	30	38
PN1	35	38	PN6	50	54
PN1	55	56	PN6	70	57
PN2A	30	41	PN6	90	62
PN2A	50	45	PN7	10	35
PN2A	70	57	PN7	30	49
PN2A	90	64	PN7	50	51
PN2A	110	66	PN7	70	55
PN2B	30	40	PN7	90	58
PN2B	50	49	PN7	110	60
PN2B	70	56	PN8	10	43
PN2B	90	63	PN8	30	50
PN2B	110	67	PN8	50	53
PN3	10	38	PN8	70	58
PN3	30	43	PN8	90	61
PN3	50	50	PN8	110	63
PN3	70	57	PN9	10	36
PN3	90	60	PN9	25	36
PN4	10	38	PN9	40	38

Table 3 *Predicted noise level for Concert Setting 2*

NSR	Height, mPD	Result, dB(A), Leq (15 min)	NSR	Height, mPD	Result, dB(A), Leq (15 min)
N1	10	33	PN4	30	38
N1	20	34	PN4	50	45
N2	10	37	PN4	70	50
N2	30	39	PN4	90	57
N2	50	43	PN5	10	35
N2	70	50	PN5	30	38
N2	90	55	PN5	50	53
N2	110	57	PN5	70	57
N2	130	58	PN5	90	58
N2	150	60	PN6	10	37
PN1	15	38	PN6	30	39
PN1	35	44	PN6	50	54
PN1	55	55	PN6	70	57
PN2A	30	41	PN6	90	62
PN2A	50	45	PN7	10	41
PN2A	70	56	PN7	30	52
PN2A	90	63	PN7	50	52
PN2A	110	66	PN7	70	55
PN2B	30	41	PN7	90	58
PN2B	50	49	PN7	110	60
PN2B	70	56	PN8	10	45
PN2B	90	63	PN8	30	51
PN2B	110	66	PN8	50	53
PN3	10	36	PN8	70	61
PN3	30	42	PN8	90	61
PN3	50	50	PN8	110	63
PN3	70	53	PN9	10	38
PN3	90	59	PN9	25	39
PN4	10	36	PN9	40	41

Table 4 *Sound Absorption Panel Specification*

Frequency, Hz	63	125	250	500	1000	2000	4000	8000
Absorption coefficient	0.25	0.25	0.65	0.85	0.83	0.75	0.55	0.55

A typical sound pressure spectrum for musical event can be found in the noise assessment for the Copper Box of Queen Elizabeth Olympic Park at London¹. On-site measurement of a rock and pop music event in Hong Kong was also performed in the Queen Elizabeth Stadium from 20:00 to 22:00 on 23 October 2015. The maximum Leq (15 mins) was 96.1 dB(A), which occurred between 20:45 and 21:00. Both sound pressure spectra are listed in **Table 5** below.

1: Noise assessment report for musical event held at the Copper Box
<http://planningregister.londonlegacy.co.uk/swift/MediaTemp/2705-41515.pdf>

Table 5 Music Event Sound Spectra

Frequency, Hz	63	125	250	500	1000	2000	4000	8000	A-weighted
Copper Box, in dB	105.0	97.0	97.0	94.0	89.0	85.0	81.0	78.0	95.5
Measurement in Hong Kong, in dB	95.9	101.9	100.0	94.7	87.3	86.2	79.8	71.2	96.1

The spectrum of the Copper Box is adopted as the sound power spectrum for musical event loudspeakers of the Main Stadium. The sound power levels (SWLs) of the loudspeakers are adjusted to give sufficient sound level at the audience area for both concert settings. In concert setting 1, the modelled sound pressure level ranges from 92.9 dB(A) to 110.1 dB(A) and the median is 98.6 dB(A); in concert setting 2, the modelled sound pressure level ranges from 92.1 dB(A) to 113.4 dB(A) and the median is 99.0 dB(A). The modelled loudspeaker spectra are listed in **Table 6**. A renowned local sound system expert has been consulted for the reasonableness of the system and the reply has been attached at the end of this Appendix.

Table 6 Modelled Loudspeaker Spectra

Frequency, Hz	63	125	250	500	1000	2000	4000	8000	A-weighted
Concert Setting 1 (P2-P6), dB	143.6	135.6	135.6	132.6	127.6	123.6	119.6	116.6	134.1
Concert Setting 1 (P7-P8), dB	140.6	132.6	132.6	129.6	124.6	120.6	116.6	113.6	131.1
Concert setting 2 (P2-P13), dB	140.1	132.1	132.1	129.1	124.1	120.1	116.1	113.1	130.6
PA system	90.4	98.9	99.5	99	98.3	98.4	95.1	91.6	104.2

Acoustic doors should be used for the entrances of the main stadium so that the noise insulation performance is not compromised. The dimensions of the doors on the inner and outer layers of the structure assumed are listed in **Table 7** below. Their locations are shown in **Figure 16**. A specification of the door is also attached in **Annex I**.

Table 7 Modelled Acoustic Doors of Main Stadium

Door	Dimension		Door	Dimension	
	Height(m)	Width(m)		Height(m)	Width(m)
1	6.8	65.7	8	4.3	38.6
2	5.7	12.0	9	4.8	50.0
3	5.7	11.8	10	5.3	42.0
4	6.8	65.7	11	6.8	70.7
5	5.7	12.0	12	5.8	38.6
6	5.7	11.8	13	5.5	46.3
7	6.8	70.7	14	5.3	42.1

Figure 1 3D model of MPSC and its surroundings

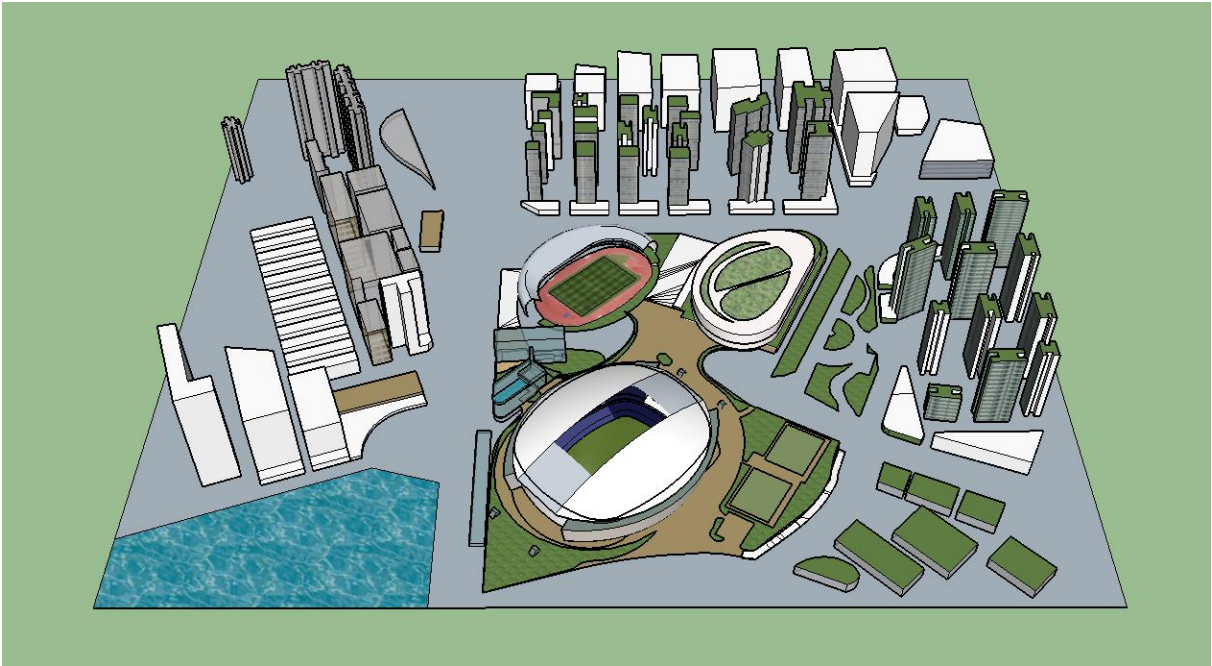


Figure 2 3D model of the Main Stadium

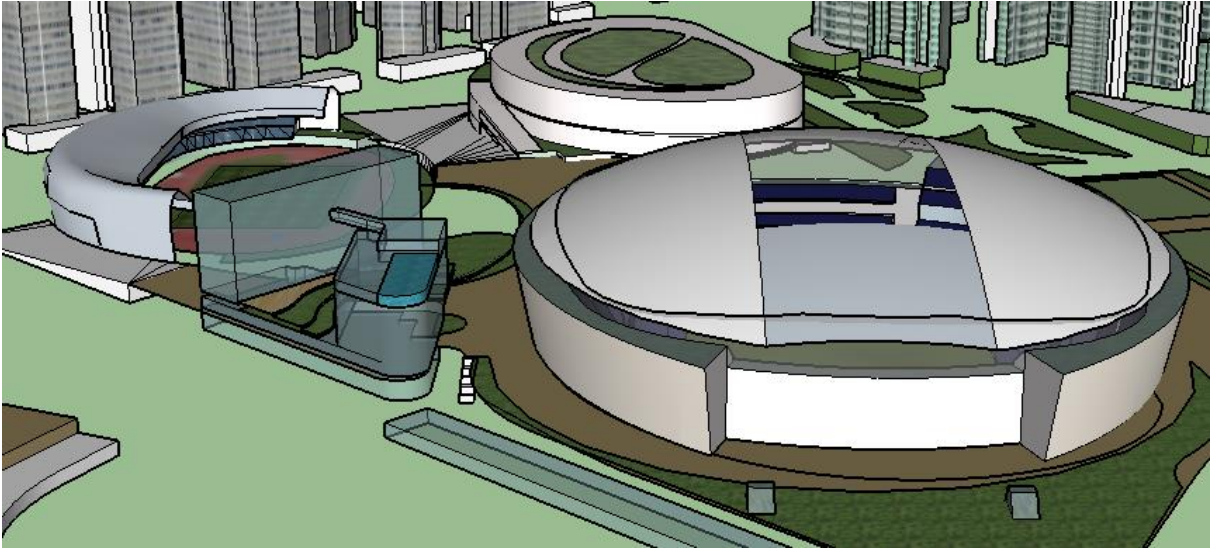


Figure 3 Frame view of noise model for MPSC and its surrounding

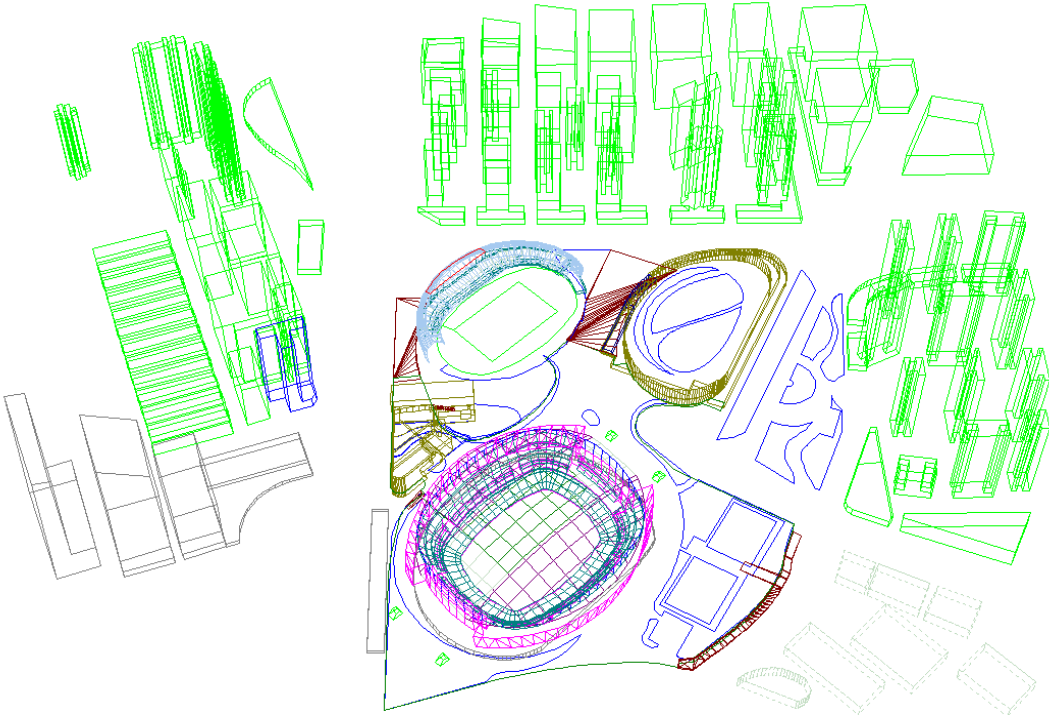


Figure 4 Frame view of noise model for Main Stadium

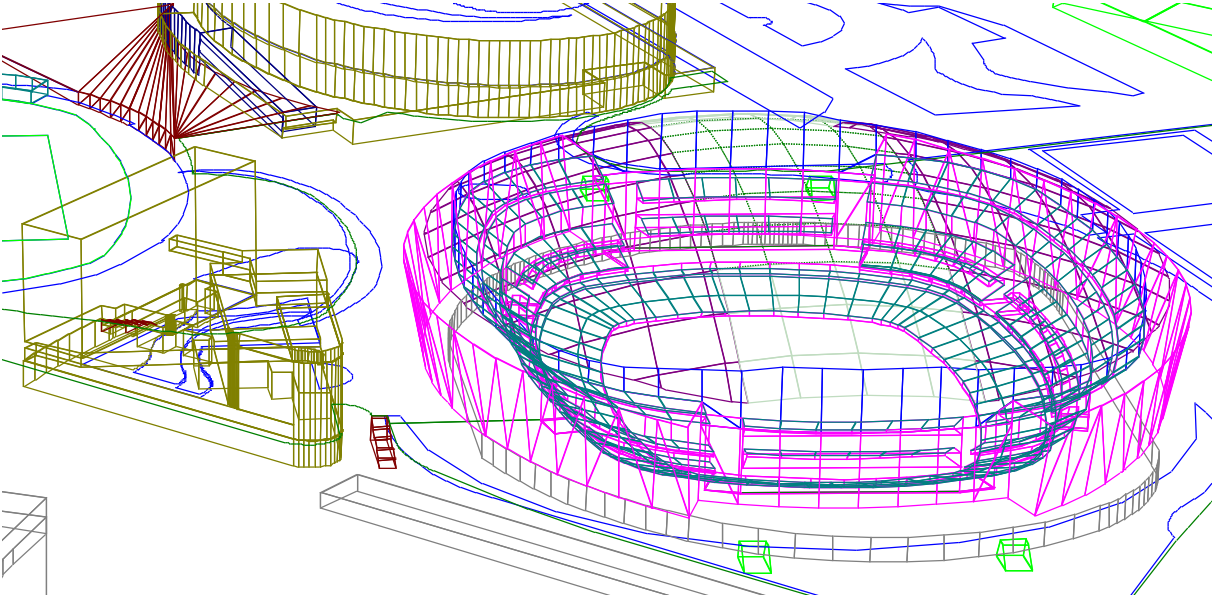


Figure 5 Retractable roof of Main Stadium (opened)

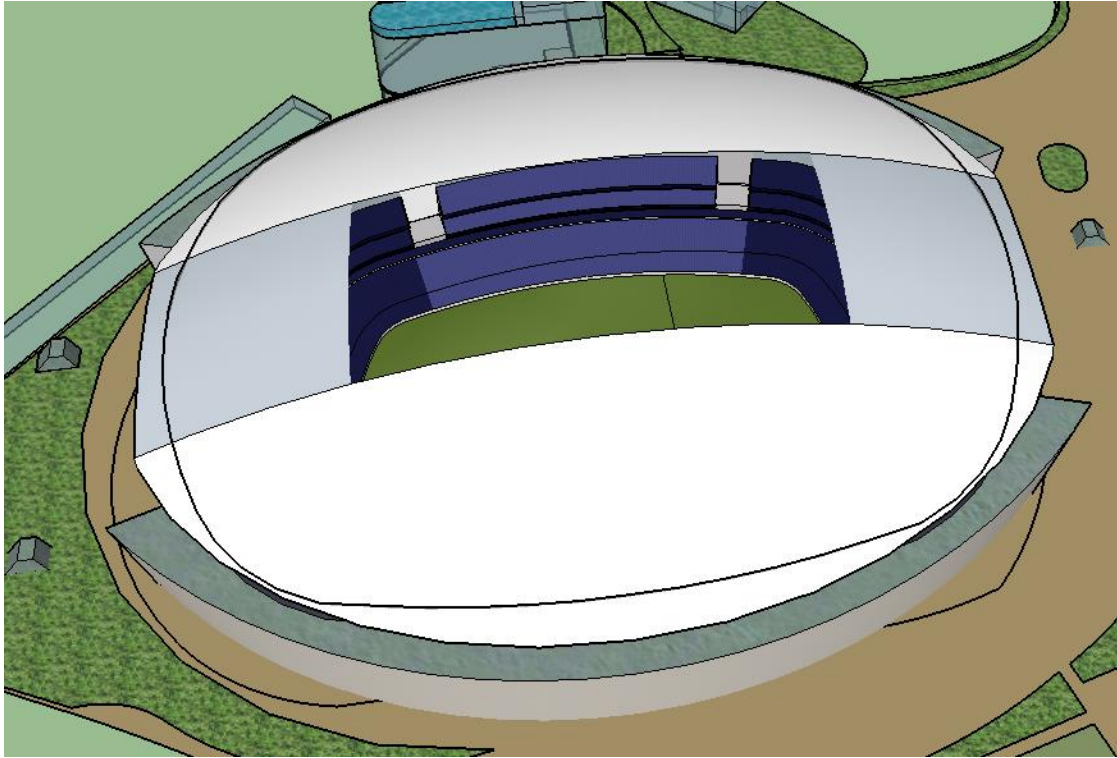


Figure 6 Retractable roof of Main Stadium (closed)

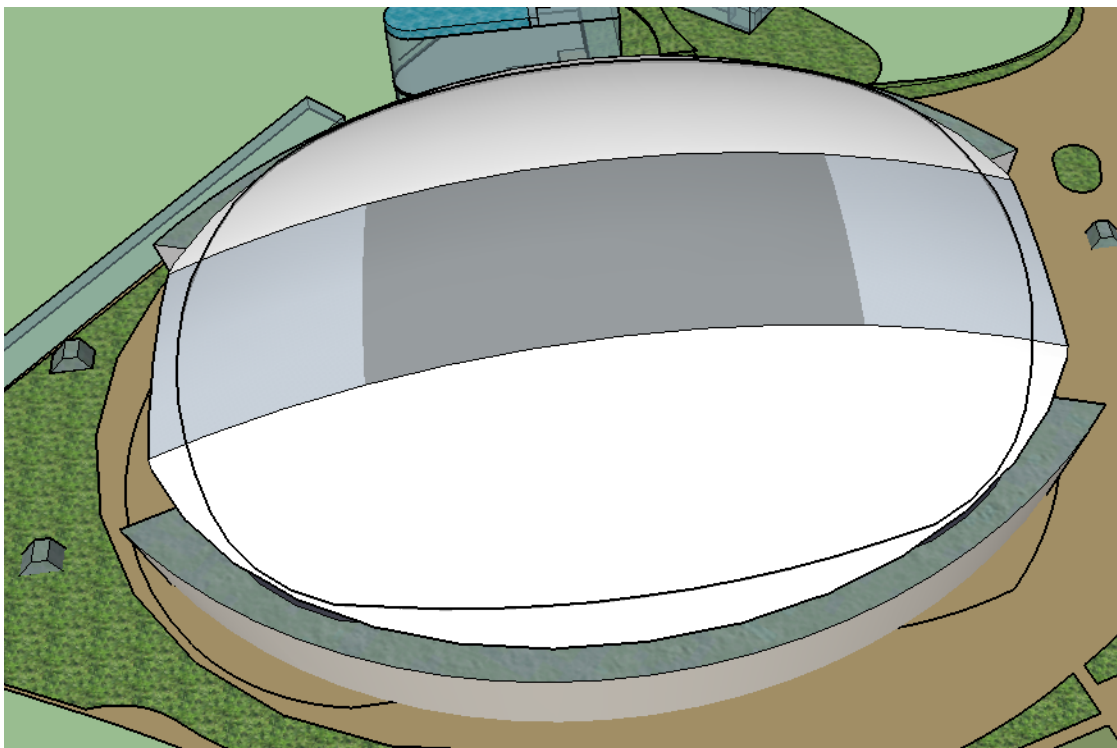


Figure 7 Positions and orientations of sporty event spectators
(red points indicate the location of the sources that represent spectators)

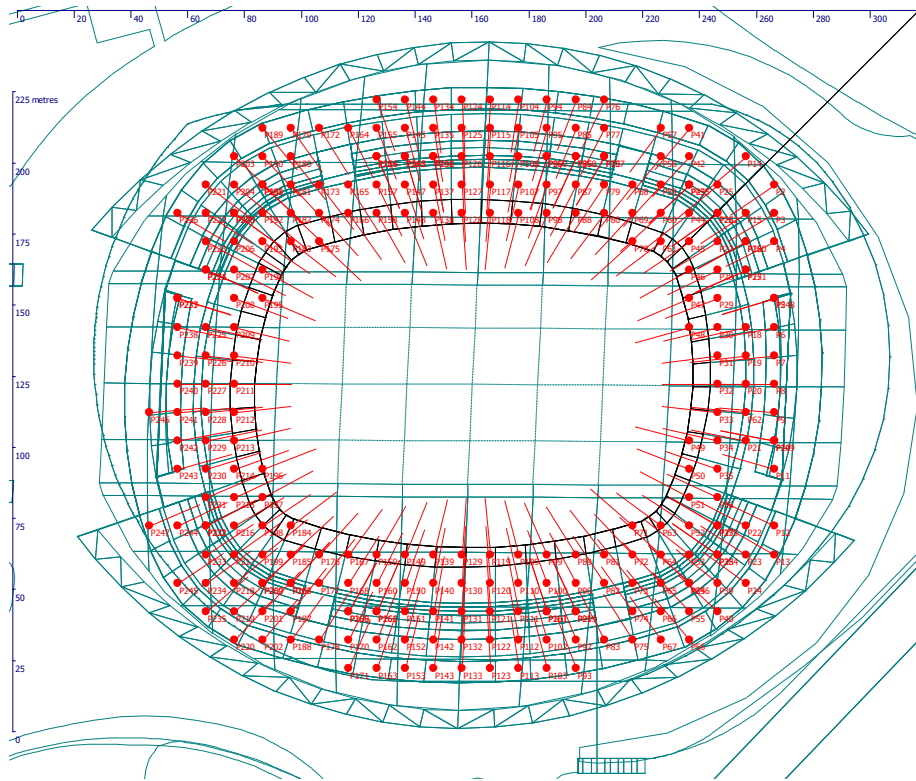


Figure 8 Positions and orientations of sporty event public address system loudspeakers
(red points indicate the location of the loudspeakers)

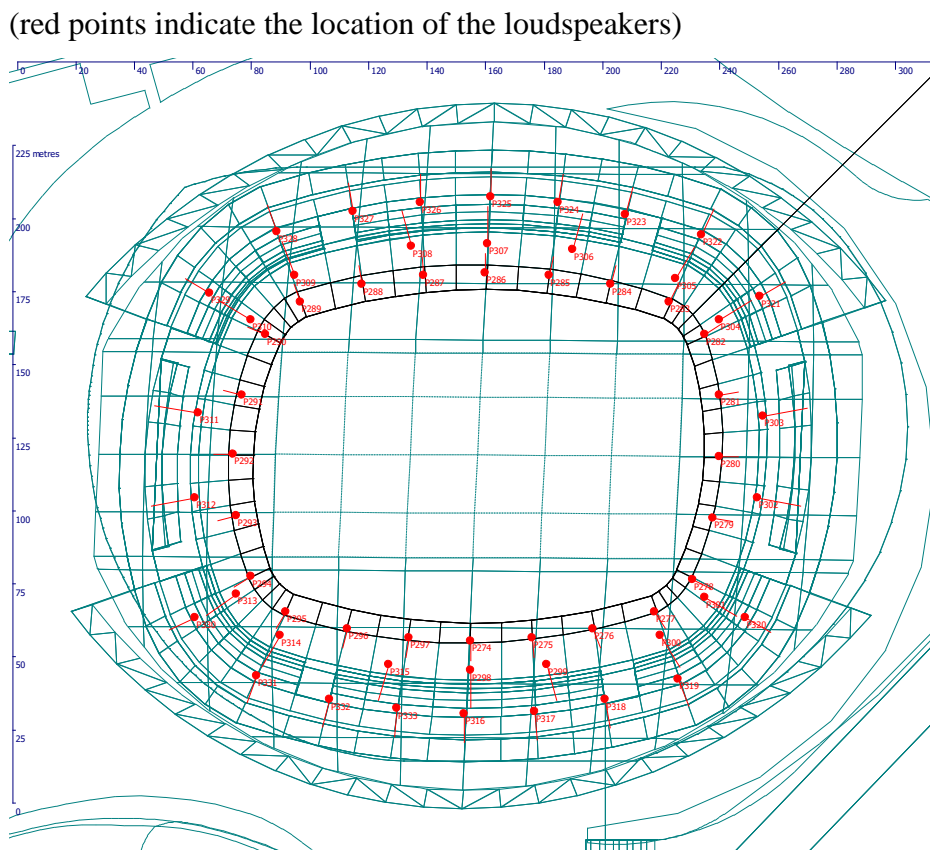


Figure 9 Location and height of the receivers in the noise model

(blue points indicate the location of the modelled receivers)

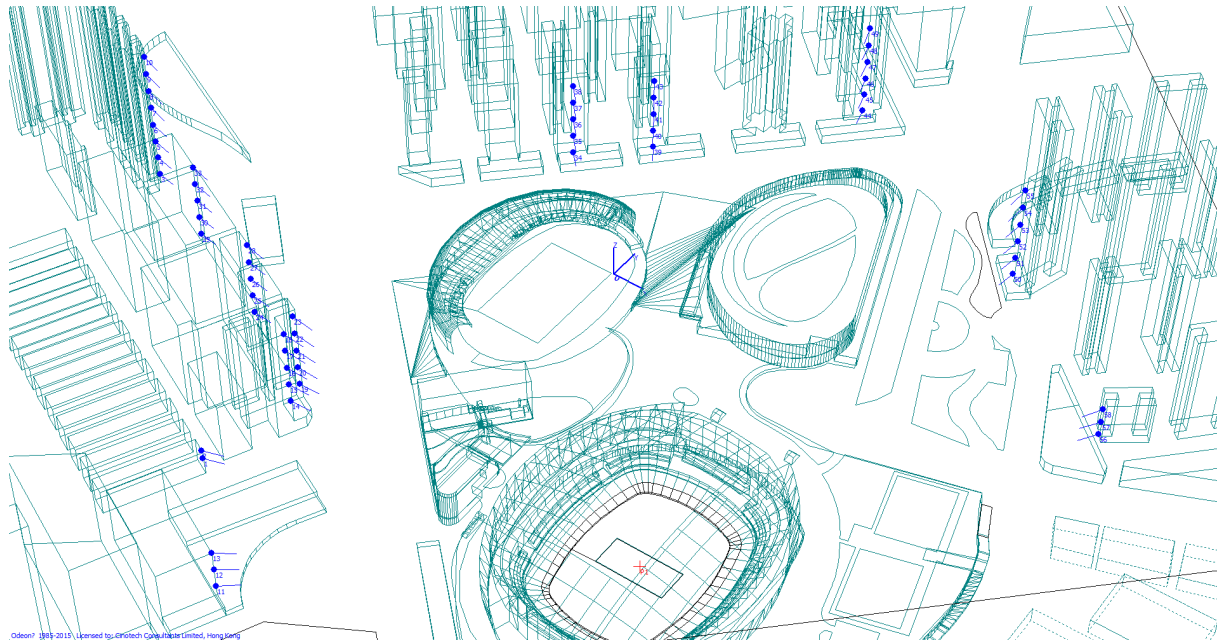


Figure 10 Positions and orientations of audiences in Concert Setting 1

(red points indicate the location of the sources that represent audiences)

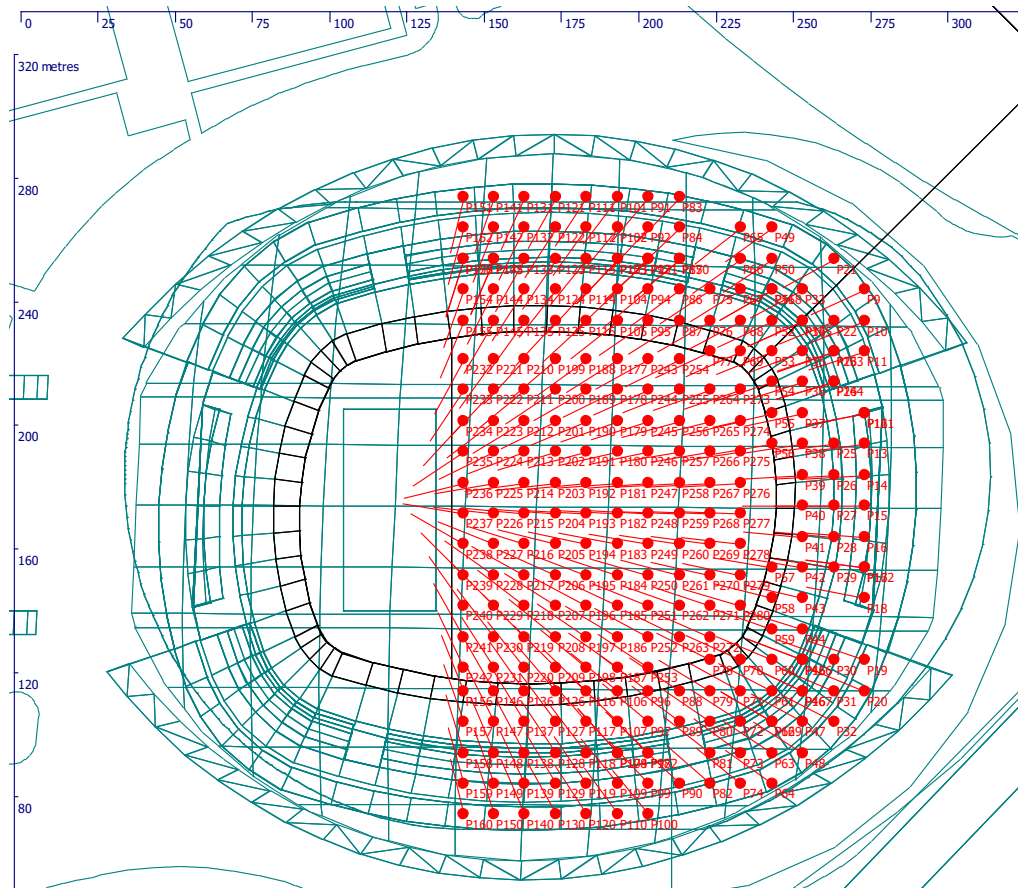


Figure 11 Positions and orientations of audiences in Concert Setting 2

(red points indicate the location of the sources that represent audiences)

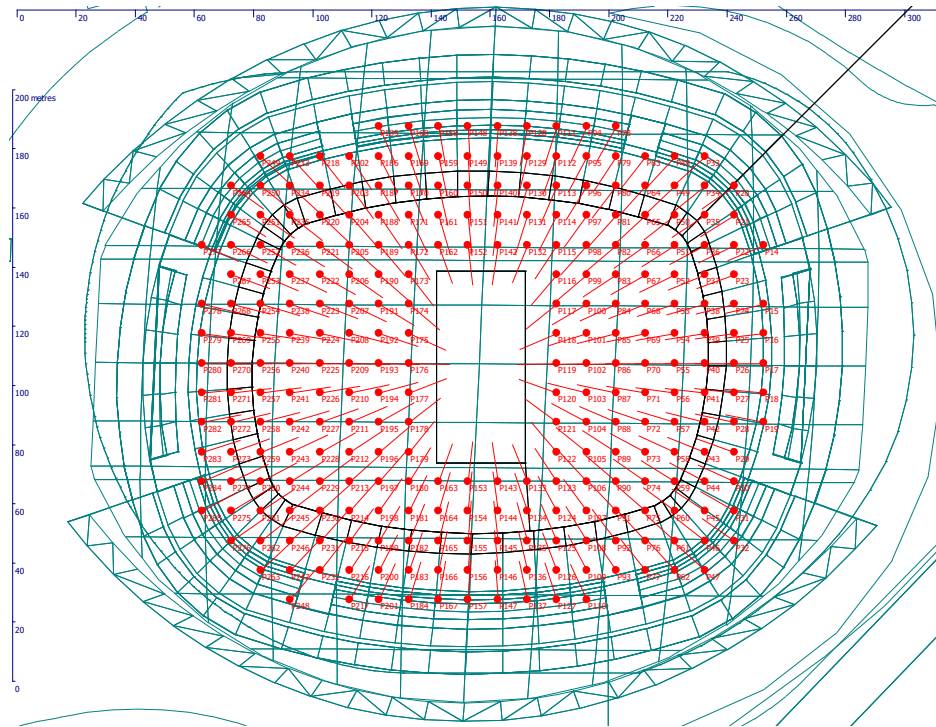


Figure 12 Positions of loudspeakers in Concert Setting 1

(red points indicate the location of loudspeakers)

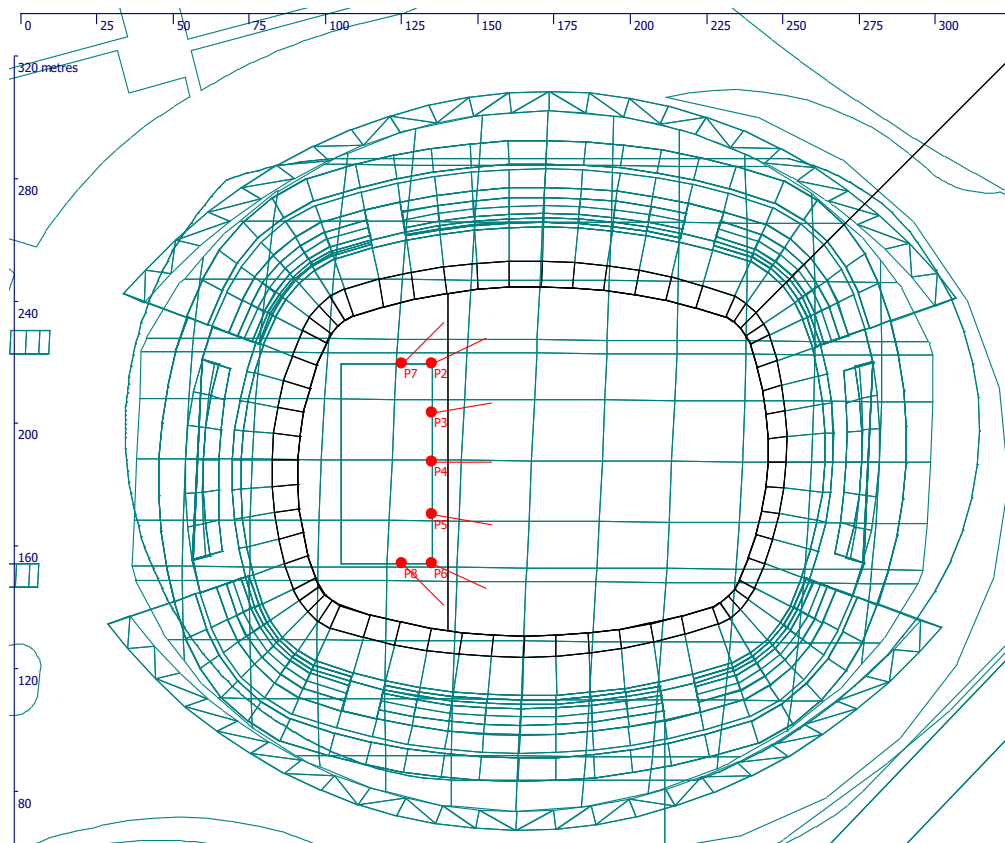


Figure 13 Positions of loudspeakers in Concert Setting 2
 (red points indicate the location of loudspeakers)

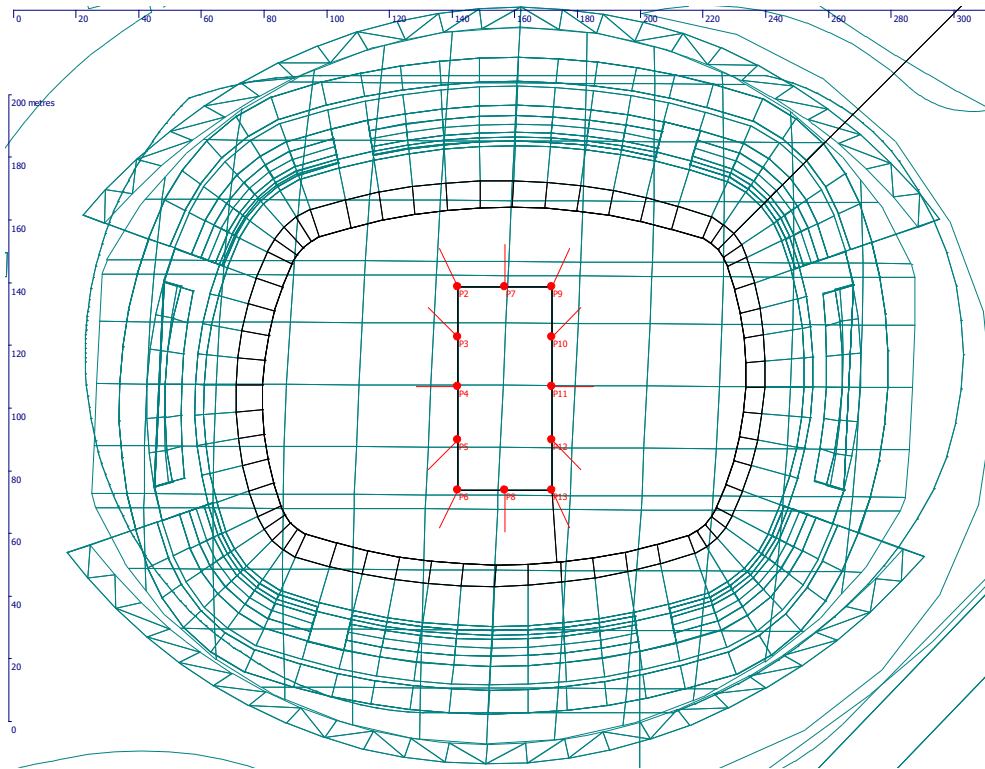


Figure 14 Unweighted Sound Pressure Level measured inside Queen Elizabeth Stadium for Pop/Rock Musical Event

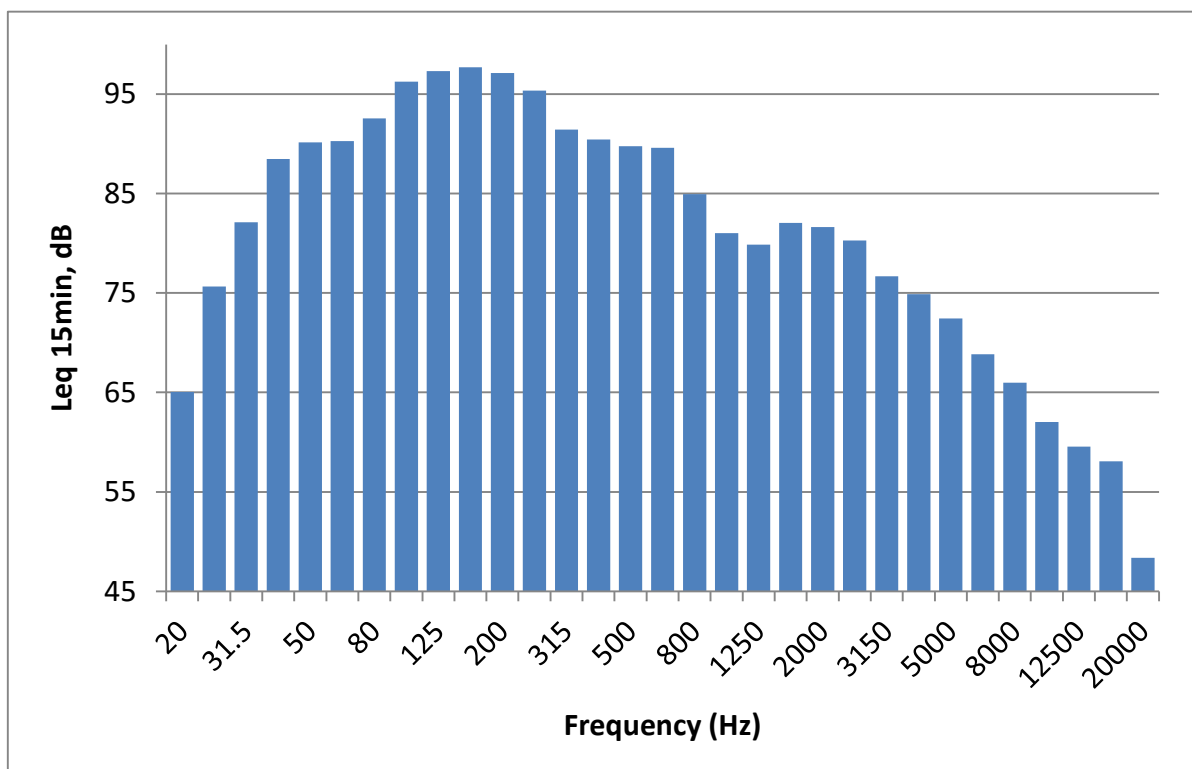


Figure 15 A-weighted Sound Pressure Level measured inside stadium for Pop/Rock Musical Event

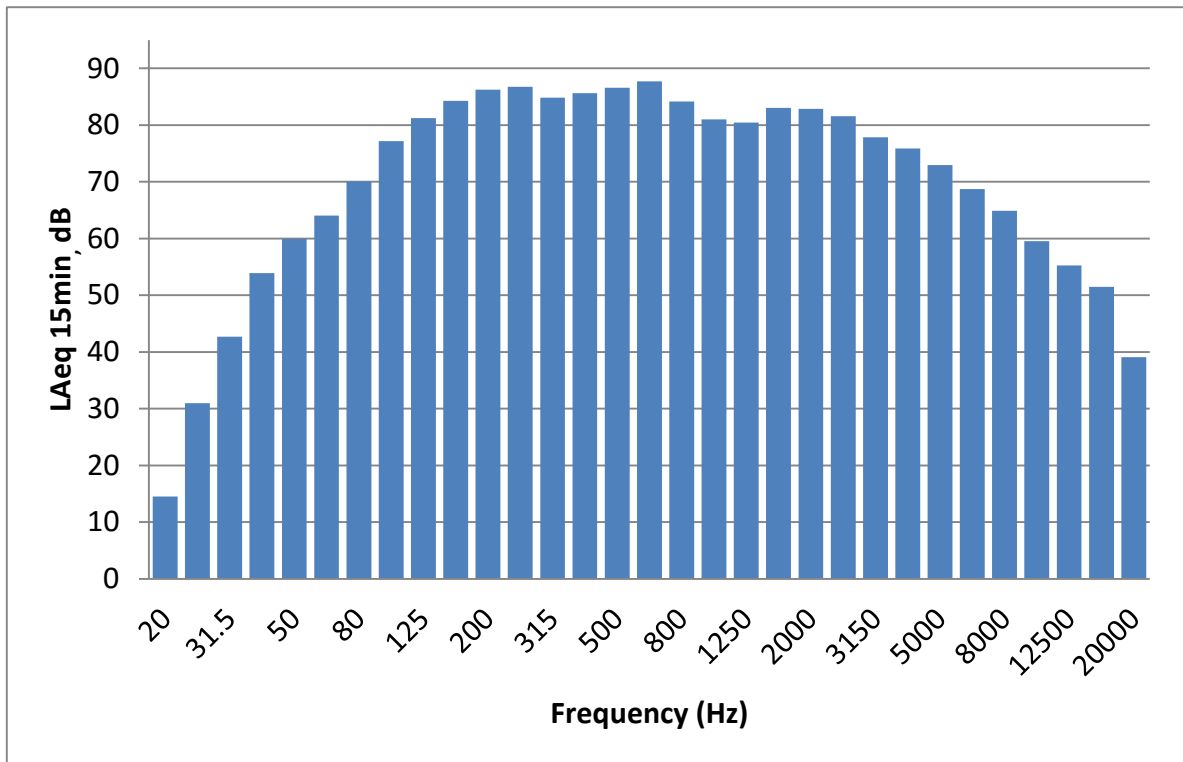
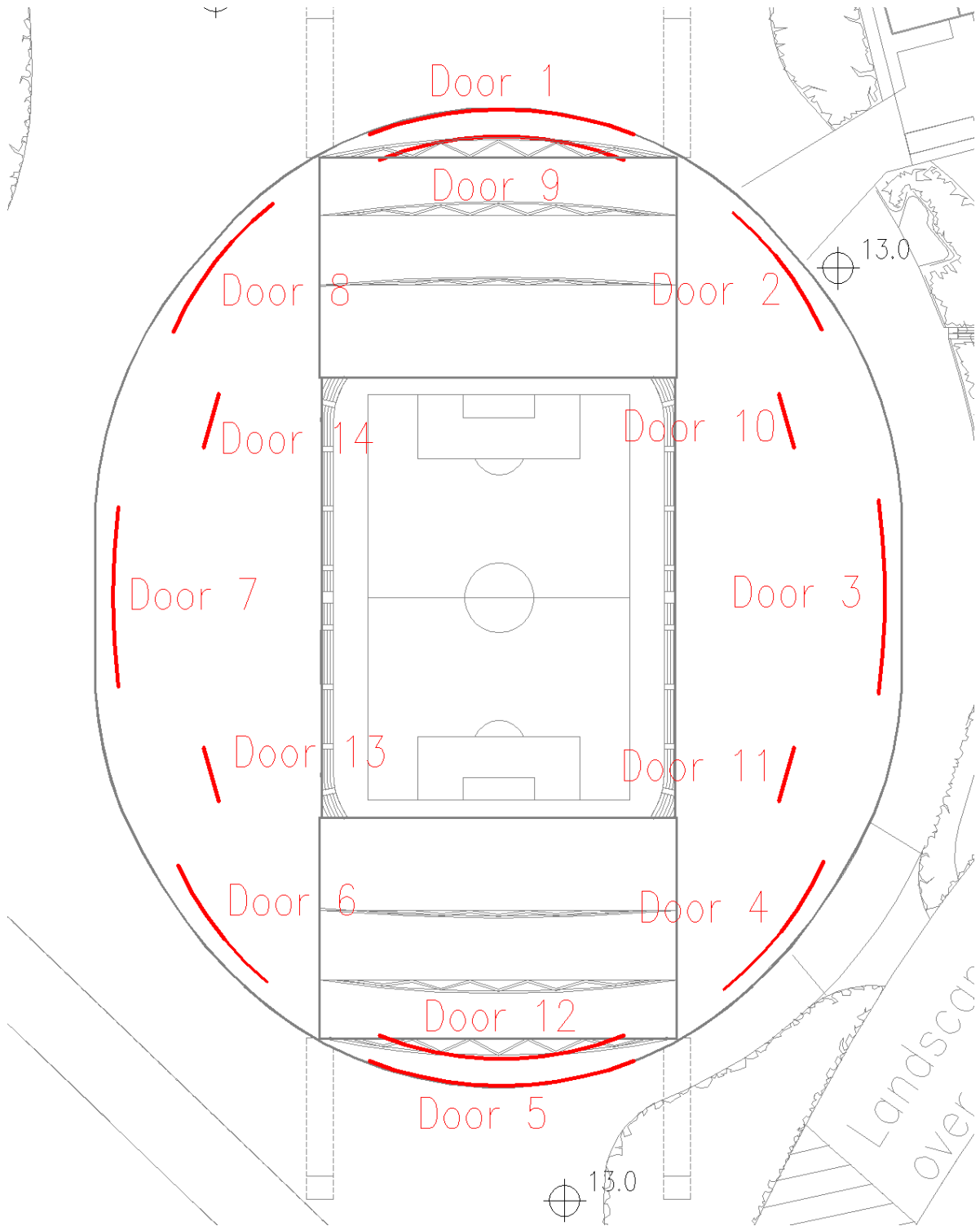
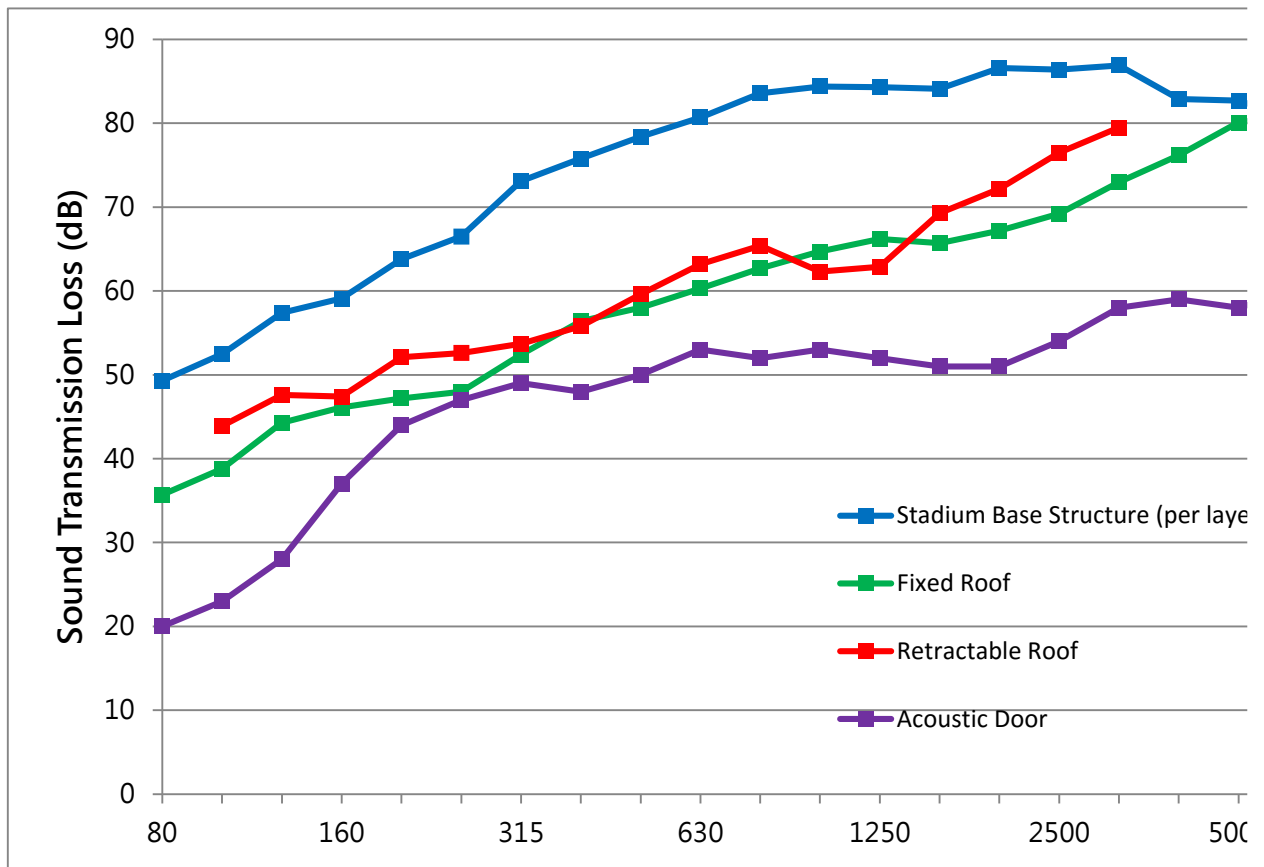


Figure 16 Location of Acoustic Doors of the Main Stadium



Annex I Specifications of sound transmission loss (in dB)



Frequency, Hz	80	100	125	160	200	250	315
Structure	49.3	52.5	57.4	59.1	63.8	66.5	73.1
Fixed Roof	35.7	38.8	44.3	46.1	47.2	48	52.4
Retractable Roof	-	43.9	47.6	47.4	52.1	52.6	53.7
Acoustic Door	20	23	28	37	44	47	49

Frequency, Hz	400	500	630	800	1000	1250	1600
Structure	75.8	78.4	80.7	83.6	84.4	84.3	84.1
Fixed Roof	56.4	58	60.3	62.7	64.7	66.2	65.7
Retractable Roof	55.8	59.6	63.2	65.4	62.3	62.9	69.3
Acoustic Door	48	50	53	52	53	52	51

Frequency, Hz	2000	2500	3150	4000	5000	6300
Structure	86.6	86.4	86.9	82.9	82.7	80.5
Fixed Roof	67.2	69.2	73	76.2	80.1	81
Retractable Roof	72.2	76.5	79.5	-	-	-
Acoustic Door	51	54	58	59	58	50

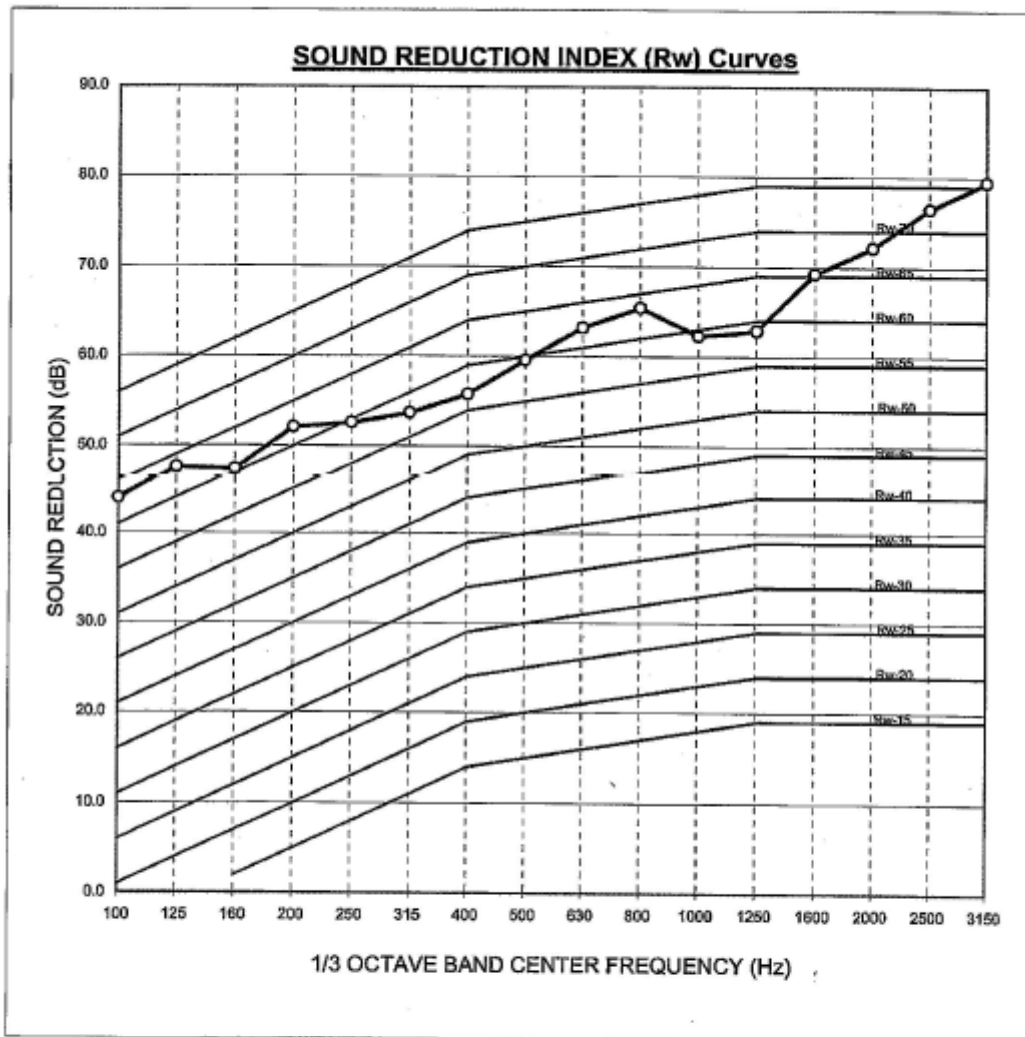
The catalogue of the adopted retractable roof and acoustic door sound reduction is provided in the following pages.

The specification of fixed roof can be found as ID TL-88-474 of the following publication.

<http://nparc.cisti-icist.nrc-cnrc.gc.ca/npsi/ctrl?action=shwart&index=an&req=20358477>

Catalogue of sound transmission loss of retractable roof adopted

TITLE: Transmission Loss Test of Wall Cladding System (Test Unit 4)
 DATE OF TEST: 9/6/2004



Freq.	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150
Rw (Input)	43.9	47.6	47.4	52.1	52.6	53.7	55.8	59.6	63.2	65.4	62.3	62.9	69.3	72.2	76.5	79.5
Rating:		Rw 63														
Summation:		29 dB														
Max. deviation:		8 dB														



Catalogue of sound transmission loss of acoustic door adopted

UK-P4-D00-0136-201507-03

Acoustic Door Specification Noise-Lock® D-50 Steel Acoustic Door

IAC Acoustics
 IAC House, Moorside Road, Winchester
 Hampshire, SO23 7US, United Kingdom
 T: +44 (0) 1962 873 000
 www.iac-acoustics.com

Construction

- Door Structure** Each leaf shall be 64mm thick, fabricated from 2.0mm thick steel sheet filled with sound absorbing and damping elements. Leaf shall be internally reinforced to accept hardware.
- Frame** Architectural split frame shall be fabricated from 2.0mm thick steel sheets, channels and plates and to be filled with sound absorbing and damping elements. Additional structural elements incorporated into the builders' wall may be required to support the door assembly, please refer to IAC Acoustics for more information.
- Acoustic Seals** Side and head of door and frame shall each receive two sets of acoustic seals. An acoustic labyrinth shall be created when door is in closed position. Bottom of door leaf shall contain continuous gravity-activated seal which shall compress against steel threshold as door is closed.
- Pre-hung** Assembly and adjustment of door leaf, frame, acoustic seals and hinges shall take place at factory to ensure ease of installation, reliable operation and maintenance of acoustic performance. The entire doorset shall be shipped to job site ready to install and operate.
- Hinges** Shall be by IAC, CAM lift design, painted to match the door.
- Preparation** Door leaf and frame shall be predrilled and tapped in accordance with manufacturer's templates to accept specified hardware.

Vision Panel (if applicable)

Double glazed window unit comprising two panes of laminated safety glass (Thickness dependant on vision panel size) sealed within 2mm steel frames to suit leaf thickness of 64mm. Acoustic absorptive material fitted between the panes. Steel frames to be RAL polyester powder coated to match the door finish.

Colour / Finishes

Leaf and frame to be polyester powder coated to standard RAL colours.

Furniture

To be confirmed - factory fit and assembly.

Acoustic Rating

Rw (C; Ctr) 50 [-3; -9] dB to achieve minimum R'w45dB once installed (subject to flanking).
 STC-51(dB) to achieve minimum NIC 46 once installed (subject to flanking).
 Certified laboratory performance in single leaf arrangement as follows:

Frequency (Hz)	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k
1/3 Octave Sound Transmission Loss (dB)	25	24	20	23	28	37	44	47	49	48	50	53	52	53	52	51	51	54	58	59	58	50	48	54
Frequency (Hz)	63			125			250			500			1k			2k			4k			8k		
Full Octave Sound Transmission Loss (dB)	22			26			46			50			52			52			58			50		

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RE: MPSC EIA - Final Draft Chapter 5 Noise Impact Assessment - Assumptions for assessment of noise from music or sports events (URGENT)

ignacio.diez@leighorange.com

to:

moonshingman@hab.gov.hk

05/08/2016 15:11

Cc:

mpsc@smwhk.com, 15112-LO@leighorange.com

Hide Details

From: "Diez Aguirre, Ignacio" <ignacio.diez@leighorange.com>

To: "moonshingman@hab.gov.hk" <moonshingman@hab.gov.hk>,

Cc: SMW MPSC Team <mpsc@smwhk.com>, 15112-KaiTak_SportComplex <15112-LO@leighorange.com>

Dear Keith,

Kindly find response from SMW highlighted in yellow below in regards the assumptions on the locations and characteristics of the loudspeakers.

Best Regards,

Ignacio Diez Aguirre

Associate

Direct Line: +852 2899 9544



Integrity | Humanity | Creativity | Sustainability

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Please consider the environment before printing this email.

From: Roy Poon [<mailto:rpoon@smwhk.com>]

Sent: Friday, August 05, 2016 3:03 PM

To: Diez Aguirre, Ignacio

Cc: SMW MPSC Team; 15112-KaiTak_SportComplex

Subject: RE: MPSC EIA - Final Draft Chapter 5 Noise Impact Assessment - Assumptions for assessment of noise from music or sports events (URGENT)

Dear Ignacio,

We had reviewed the assumption of the speaker systems in the EIA report.

The location of the speakers is similar to what we discussed and the parameters are reasonable.

A minor comment that in page 2 Table A and Table B, the term "Noise Level at Spectator Stand", in our opinion, it should be "Sound Level at Spectator Stand".

Regards,

Roy

From: moonshingman@hab.gov.hk [<mailto:moonshingman@hab.gov.hk>]

Sent: Friday, August 05, 2016 12:38 PM

To: Diez Aguirre, Ignacio

Cc: 15112-KaiTak_SportComplex; moonshingman@hab.gov.hk; mpsc@smwhk.com

Subject: RE: MPSC EIA - Final Draft Chapter 5 Noise Impact Assessment - Assumptions for assessment of noise from

Appendix 5.4B

Human Noise Level Determination

1 INTRODUCTION

- 1.1 In order to assess the noise impact of sports events and musical events held in the MPSC, representative sound power levels of the audiences or spectators during such events should be established.
- 1.2 In this appendix, the procedures to obtain the required sound power levels were described. The results were determined in terms of the average sound power per person.
- 1.3 Noise levels from previous relevant events were measured. A model was set up to simulate the noise propagation inside the venue. The simulated results were then compared with the measurements to obtain an estimation of the noise level of human beings.

2 RELEVANT EVENTS AND MEASUREMENTS

- 2.1 On-site measurements were conducted at the Hong Kong Stadium for three events. Details of the events are listed in **Table 2-1**. Noise levels were recorded at certain locations on the spectators stand. The locations are marked in **Figure 2-1**.

Table 2-1 Measured Events in Hong Kong Stadium

Event	The Meeting of Champions: Kitchee vs Paris Saint-Germain	HKFA Centennial Celebration Match: Hong Kong vs Argentina	2015 Cathay Pacific/HSBC Hong Kong Sevens
Measurement Date	29 July 2014	14 October 2014	28 March 2015
Measurement Time	19:22–21:39	19:28–21:20	13:34–18:19
Attendances	17,153	20,230	39,098

- 2.2 The noise data are analysed and the L_{eq} (30min) recorded are listed in **Table 2-2** and **Table 2-3**.

Table 2-2 Recorded L_{eq} (30min), in dB(A) of football matches in Hong Kong Stadium

Event Date	29 July 2014				14 October 2014			
Location/Time	A	B	C	D	A	B	C	D
19:30-20:00	82.4	82.7	77.7	82.5	82.9	83.1	78.5	81.6
20:00-20:30	87.8	87.9	82.2	87.9	85.2	84.6	83.3	85.6
20:30-21:00	83.2	82.6	78.2	83.7	84.7	84.4	82.0	84.2

21:00-21:30	85.2	83.7	80.7	85.2	-	-	-	-
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Table 2-3 Recorded L_{eq} (30min) during Hong Kong Sevens

Time	14:00	14:30	15:00	15:30	16:00	16:30	17:00	17:30
	14:30	15:00	15:30	16:00	16:30	17:00	17:30	18:00
Leq (30min) at Location A, dB(A)	88.2	90.9	89.5	86.9	86.7	92.7	89.2	88.4
Leq (30min) at Location B, dB(A)	87.7	91.3	90.1	87.3	87.1	92.5	89.1	87.3

- 2.3 Noise from loudspeakers of the public address system was not excluded from the above results for a conservative approach. The noise level recorded is considered to be dominated by spectator noise. The higher noise level of 14:30–15:00 and 15:00–15:30 in **Table 2-3** was associated to a music performance which last from 14:40 to 15:07.
- 2.4 The distribution of spectators in each of the events was photographed. This information was used in the modelling of noise propagation in Section 4.

3 HUMAN VOICE SPECTRUM

- 3.1 The measured sound pressure spectrum of human noise and some reference sound power spectrum of human voice at various vocal effort¹ are shown in **Table 3-1**. These spectra were plotted in **Figure 3-1**.

Table 3-1 Sound Spectrum of Human Voice

Spectra, dB re 1pW vs frequency, Hz	63	125	250	500	1000	2000	4000	8000	A-weighted
Measured spectrum	55.8	57.1	65.5	75.9	82.1	73.7	65.6	55.5	83.0
Normal	45.0	55.0	65.3	69.0	63.0	55.8	49.8	44.5	68.4
Raised	48.0	59.0	69.5	74.9	71.9	63.8	57.3	48.4	75.5
Loud	52.0	63.0	72.1	79.6	80.2	72.9	65.9	54.8	82.6
Shouted	52.0	63.0	73.1	84.0	89.3	82.4	74.9	64.1	91.0

- 3.2 Two observations can be made from the figure. Firstly, the peak power of human voice shifts to higher frequencies when the vocal effort increases. Secondly, the measured spectrum almost coincided with that of the “Shouted” spectrum.
- 3.3 Low frequency noise are more penetrating and hence more probable in affecting NSRs

1: The reference spectrum for human voice can be found in Table 1 of the following document:
http://www.odeon.dk/pdf/Application_Note_SpeechTransmissionIndex.pdf

surrounding the MPSC. Therefore, the spectrum of “Loud” vocal effort was adopted for a conservative purpose in this assessment.

4 3D MODELLING

- 4.1 A special acoustic modelling for the stadium was performed, which took into account the building geometry and design. Typical sound absorption and scattering properties for various building components were adopted in the model.
- 4.2 The spectators were represented by a number of point sources. A sound power frequency spectrum of “Loud” vocal effort was adopted in the modelling. A directivity profile of the voice of human beings² was used for the sources representing spectators. The sources were placed on the stand according to the photographic record of the spectators during the event and were configured to face towards the centre of the stadium.
- 4.3 **Table 4-1** list the number of sources used in each of the events. The distribution of the sources and the location of the receivers (i.e. measurements) can be found in **Figure 4-1** to **Figure 4-3** respectively.

Table 4-1 Number of Point Sources Used

Event Date	29 July 2014	14 October 2014	28 March 2015
Attendances	17,153	20,230	39,098
Number of sources used	135	154	213

5 ACOUSTIC MODEL SIMULATION RESULTS

- 5.1 By varying the assumed sound power level (SWL) per person, one may match the simulation result of the acoustic model with the measured noise level. In other words, for each 30 minute time interval, one can infer a sound power level per person corresponding to the measurement result. The highest noise level measured among different locations were chosen for a conservative approach.

Table 5-1 Modelling Results of the Events on 29 Jul and 14 Oct 2014, Leq (30min)

Event Date	29 July 2014		14 October 2014	
[in unit dB(A)]	Highest Measured SPL	Corresponding SWL per person	Highest Measured SPL	Corresponding SWL per person
19:30-20:00	82.7	80.2	83.1	81.0
20:00-20:30	87.9	85.4	85.6	82.0

2: Reference for human voice directivity:

<http://nparc.cisti-icist.nrc-cnrc.gc.ca/npsi/ctrl?action=shwart&index=an&req=20378930>

20:30-21:00	83.7	80.4	84.7	82.9
21:00-21:30	85.2	81.9	-	-

Table 5-2 Modelling Results of the Events on 28 Mar 2015, Leq (30min)

Time	14:00	14:30	15:00	15:30	16:00	16:30	17:00	17:30
	14:30	15:00	15:30	16:00	16:30	17:00	17:30	18:00
Highest Measured SPL	88.2	91.3	90.1	87.3	87.1	92.7	89.2	88.4
Corresponding SWL per person	83.6	86.5	85.2	82.5	82.3	88.1	84.6	83.8

- 5.2 Among the sound power level determined, those corresponding to the time period 19:30-20:00 in **Table 5-1** should be discarded as the football matches had not yet begun. Those corresponding to 14:30-15:00 and 15:00-15:30 in **Table 5-2** should also be discarded since a musical performance was taking place during that time as mentioned before. The sound power during 16:30-17:00 in **Table 5-2** was considered as an outlier due to children's playing near the measurement location. The 10 remaining results are bolded in the above tables.
- 5.3 10 sound power levels per person were determined from the measured 30 minute time intervals in sports events. The maximum of these 10 levels was adopted in order to assess the worst case scenario of human noise, which was 85.4 dB(A).

6 MUSICAL EVENT HUMAN NOISE LEVEL

- 6.1 In a musical event, the spectator noise is mixed with noise from loudspeakers. It is impossible to measure the noise level of the audiences independently. Therefore, in the noise impact assessment of MPSC, the sound power level of the audiences in a musical event was determined from that of the spectators in a sports event. Human noise in sports event should be louder than that in a musical event. Therefore, this approach was considered as a conservative approach.
- 6.2 The noise criteria for music, singing and instrument performing activities is stipulated in terms of Leq (15min). Hence a human noise level of Leq (15min) shall also be determined for modelling purpose. The above procedures in determining human noise level of Leq (30min) was repeated for the Leq (15min) case. **Table 6-1** to **Table 6-4** shows the corresponding data for this case.
- 6.3 As described in Section 5.2, some of the sound power level determined shall be discarded due to various reasons. Among the 22 sound power levels per person determined from the measured 15 minute time intervals, the maximum level of 86.8 dB(A) was adopted for the worst case scenario.

Table 6-1 Recorded L_{eq} (15min), in dB(A) of football matches in Hong Kong Stadium

Event Date	29 July 2014				14 October 2014			
Location/ Time	A	B	C	D	A	B	C	D
19:30-19:45	-	-	-	-	80.8	80.8	75.7	79.8
19:45-20:00	84.5	84.8	79.7	84.5	84.0	84.3	79.7	82.5
20:00-20:15	89.1	89.2	83.5	89.2	84.2	82.9	81.6	84.6
20:15-20:30	86.2	86.2	80.2	86.1	85.8	85.5	84.3	86.3
20:30-20:45	83.8	83.1	78.4	83.4	85.9	85.2	83.8	85.6
20:45-21:00	82.3	81.9	78.0	83.9	83.2	83.4	78.8	82.3
21:00-21:15	84.5	82.9	78.0	83.4	-	-	-	-
21:15-21:30	85.8	84.4	82.4	86.4	-	-	-	-

Table 6-2 Recorded L_{eq} (15min) during Hong Kong Sevens

Time	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45
	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00
L_{eq} (15min) at Location A, dB(A)	87.9	88.6	88.3	92.5	91.6	85.6	86.8	87.0
L_{eq} (15min) at Location B, dB(A)	87.1	88.2	88.6	93.0	91.9	86.5	87.4	87.2
Time	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45
	16:15	16:30	16:45	17:00	17:15	17:30	17:45	17:00
L_{eq} (15min) at Location A, dB(A)	86.4	87.0	91.4	93.8	90.1	88.2	87.9	88.8
L_{eq} (15min) at Location B, dB(A)	87.1	87.1	91.3	93.4	90.1	87.8	87.7	86.8

Table 6-3 Modelling Results of the Events on 29 Jul and 14 Oct 2014, Leq (15min)

Event Date	29 July 2014		14 October 2014	
[in unit dB(A)]	Highest Measured SPL	Corresponding SWL per person	Highest Measured SPL	Corresponding SWL per person
19:45-20:00	84.8	82.2	84.3	82.2
20:00-20:15	89.2	85.9	84.6	81.0
20:15-20:30	86.2	84.7	86.3	82.7
20:30-20:45	83.8	82.4	85.9	84.0
20:45-21:00	83.9	80.7	83.4	81.3
21:00-21:15	84.5	83.0	-	-
21:15-21:30	86.4	83.1	-	-

Table 6-4 Modelling Results of the Events on 28 Mar 2015, Leq (15min)

Time	14:00	14:15	14:30	14:45	15:00	15:15	15:30	15:45
	14:15	14:30	14:45	15:00	15:15	15:30	15:45	16:00
Highest Measured SPL	87.9	88.6	88.6	93.0	91.9	86.5	87.4	87.2
Corresponding SWL per person	83.3	83.9	83.8	88.2	87.1	81.6	82.5	82.4
Time	16:00	16:15	16:30	16:45	17:00	17:15	17:30	17:45
	16:15	16:30	16:45	17:00	17:15	17:30	17:45	17:00
Highest Measured SPL	87.1	87.1	91.4	93.8	90.1	88.2	87.9	88.8
Corresponding SWL per person	82.3	82.3	86.8	89.2	85.5	83.6	83.3	84.2

7 CONCLUSION

- 7.1 A representative sound power level per person was obtained in order to assess the noise impact from human activities in the MPSC. A series of noise measurements were carried out in the Hong Kong Stadium during sports events. The sound power can be estimated from these measurement results through acoustic modelling of the stadium.
- 7.2 A set of sound power levels were determined, each for a 30 minutes time interval. They demonstrated the varying noise level from human activities during sports events. A representative Leq (30min) of human voice was determined to be 85.4 dB(A) per person.
- 7.3 The Leq (15min) of human voice was needed for the assessment of noise impact of musical events. The same procedure for determining human voice Leq (30min) was repeated for the Leq (15min) case. It was concluded that a representative Leq (15min) human voice was 86.8 dB(A) per person.

Figure 2-1 Measurement Locations on spectator stand of Hong Kong Stadium

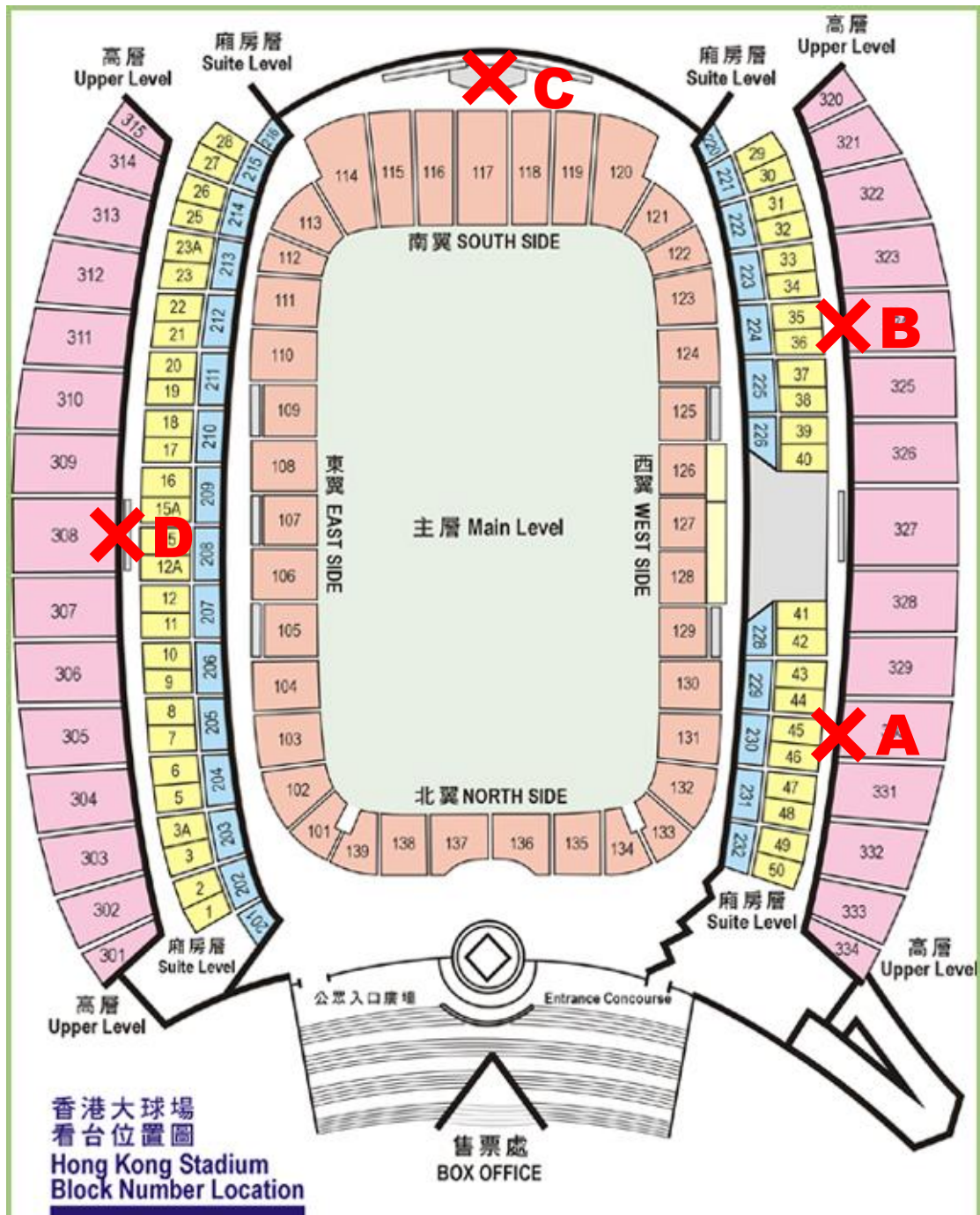


Figure 3-1 Human Voice Spectrum

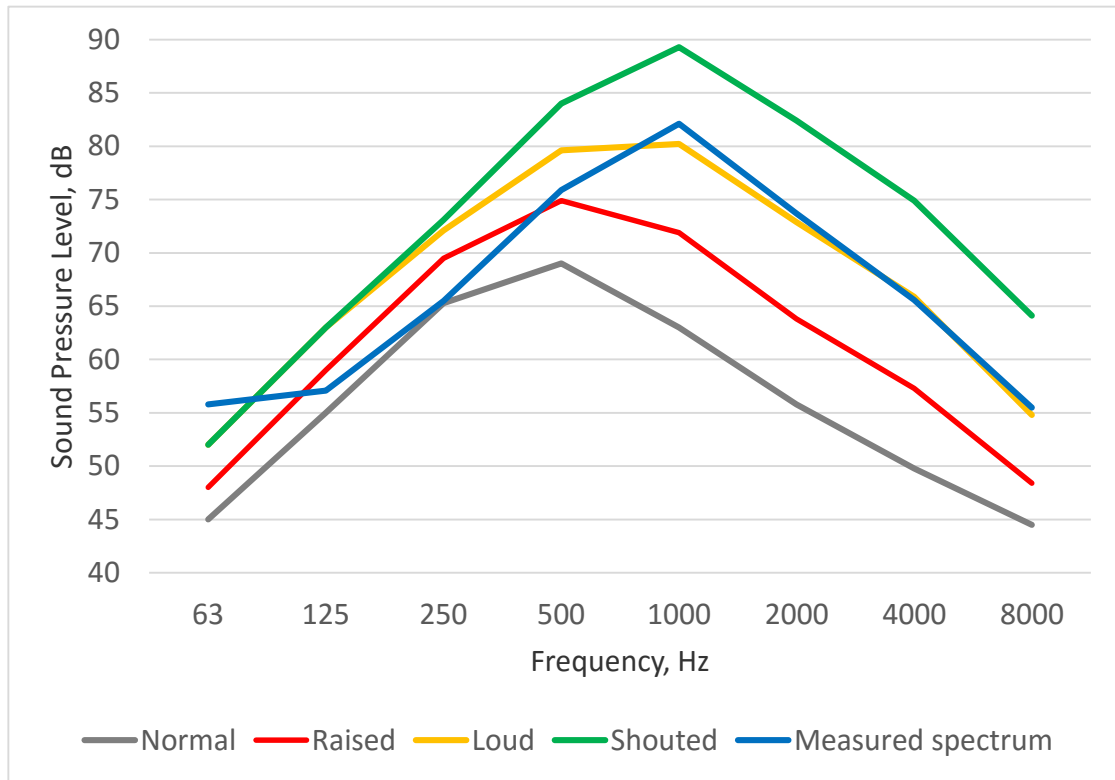


Figure 4-1 Distribution of sources and locations of receivers for the event on 29 July 2014

Red points indicate the location of the sources that represent spectators.

Blue points indicate the location of the modelled receivers corresponding to the measurement locations.

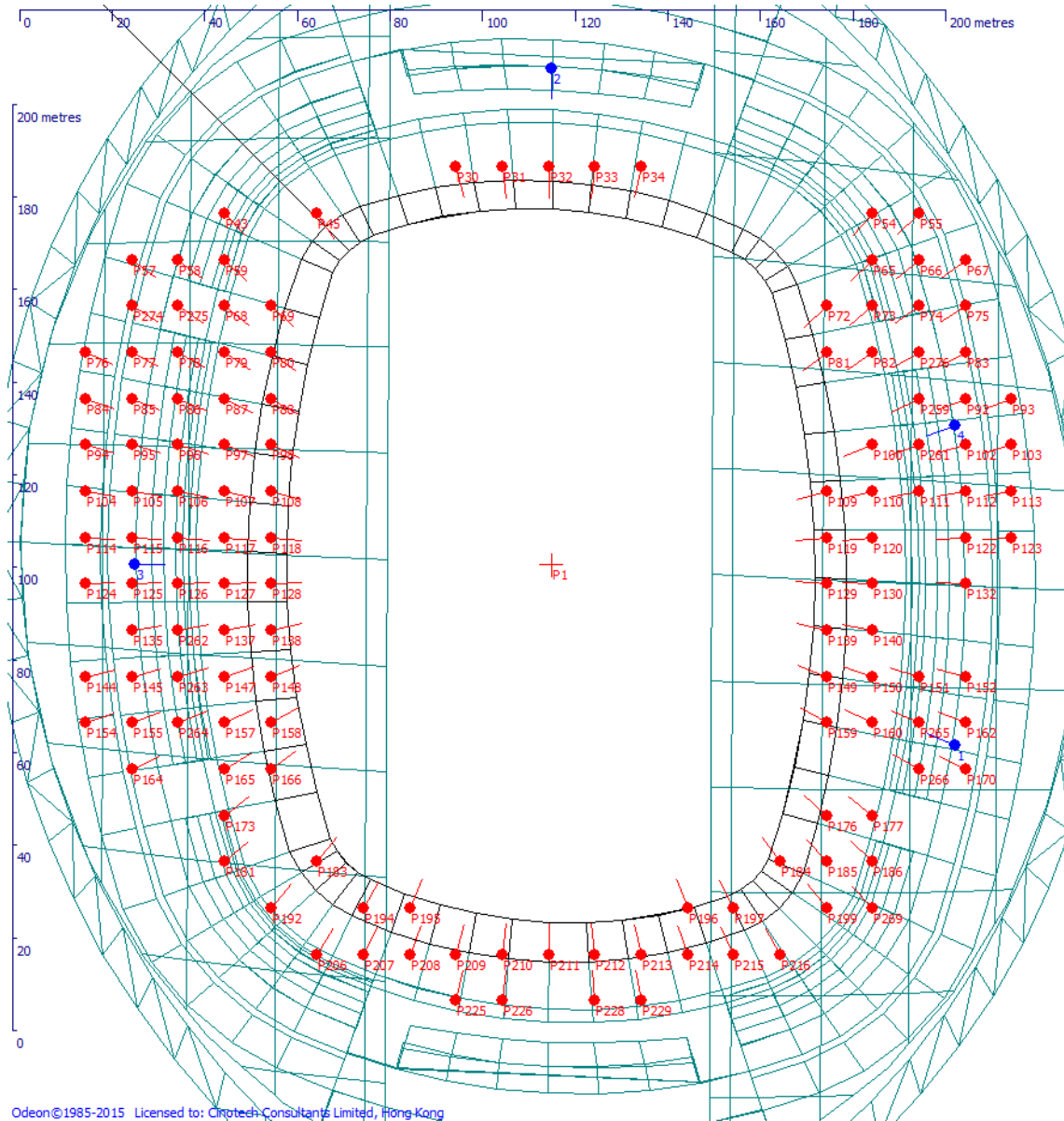
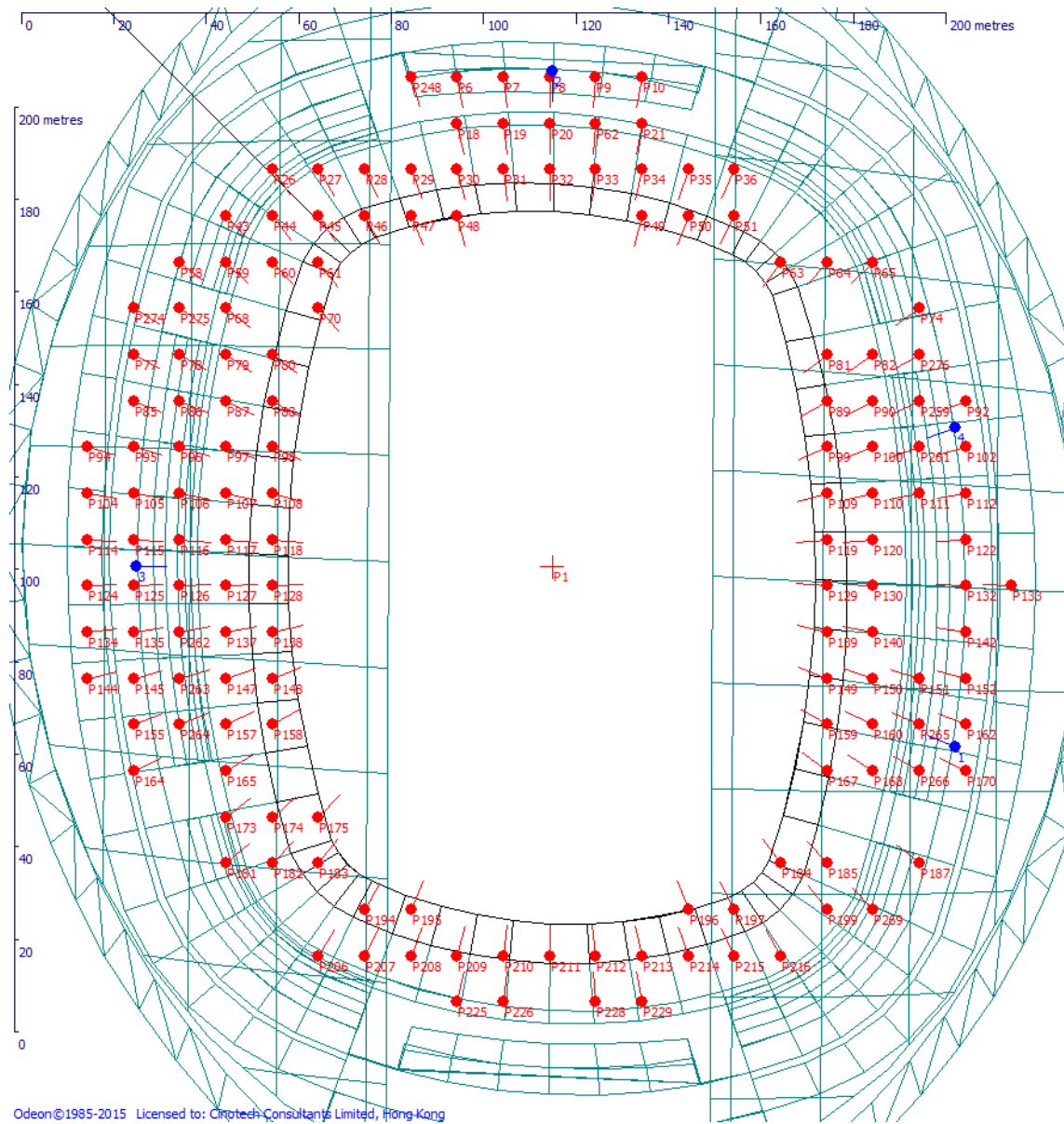


Figure 4-2 Distribution of sources and locations of receivers for the event on 14 October 2014

Red points indicate the location of the sources that represent spectators.

Blue points indicate the location of the modelled receivers corresponding to the measurement locations.

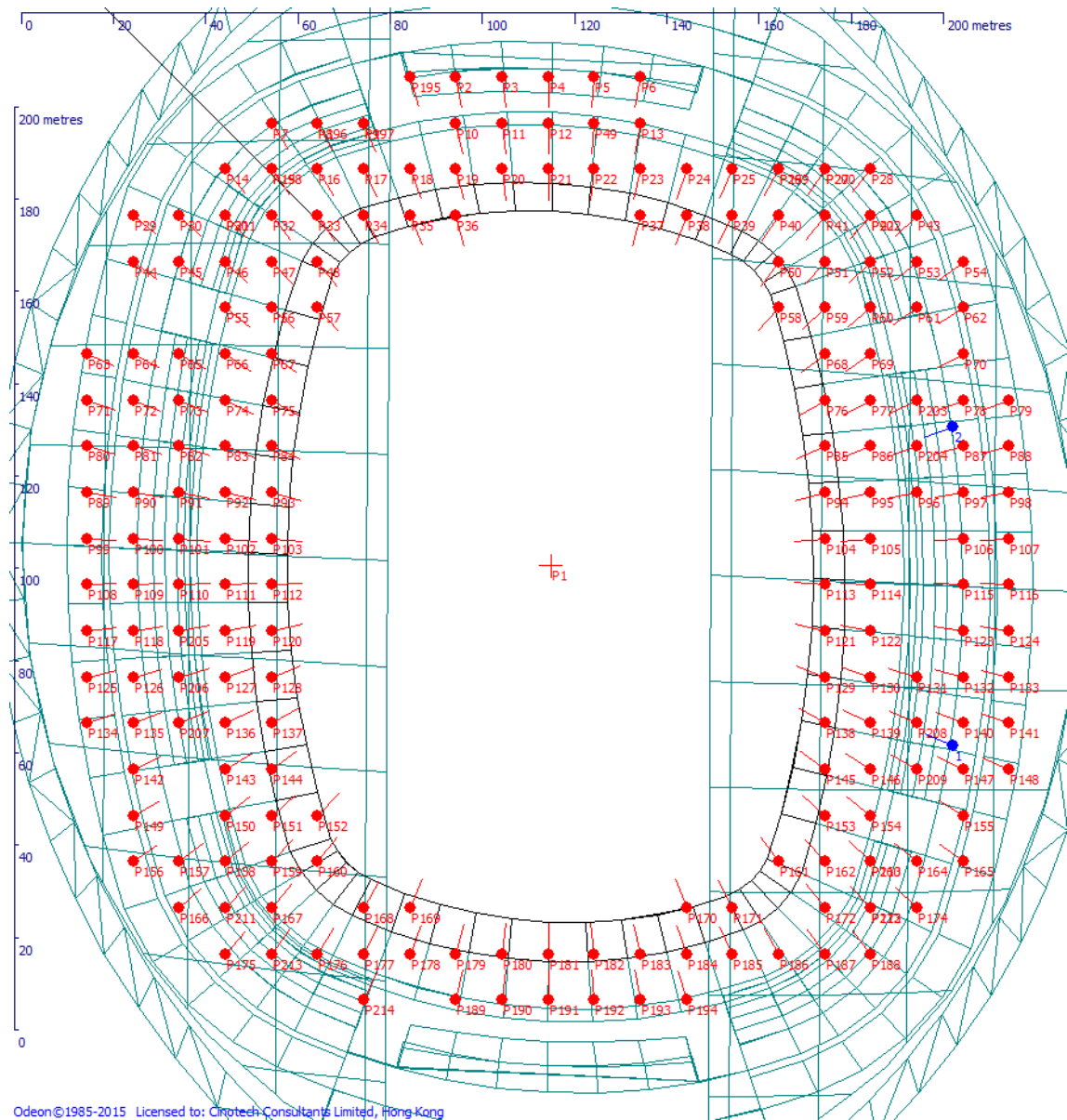


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Figure 4-3 Distribution of sources and locations of receivers for the event on 28 March 2015

Red points indicate the location of the sources that represent spectators.

Blue points indicate the location of the modelled receivers corresponding to the measurement locations.



Appendix 5.4C

**Fixed Noise Assessment for Public Sports
Ground**

Table 1 *Sound Absorption Panel Specification*

Frequency, Hz	63	125	250	500	1000	2000	4000	8000
Absorption coefficient	0.25	0.25	0.65	0.85	0.83	0.75	0.55	0.55

Table 2 *Predicted noise level at NSRs*

NSR	Height, mPD	Result, dB(A), Leq (30 min)	NSR	Height, mPD	Result, dB(A), Leq (30 min)
N1	10	50	PN4	30	53
N1	20	48	PN4	50	55
N2	10	50	PN4	70	56
N2	30	54	PN4	90	56
N2	50	54	PN5	10	55
N2	70	54	PN5	30	58
N2	90	55	PN5	50	59
N2	110	54	PN5	70	59
N2	130	53	PN5	90	59
N2	150	52	PN6	10	56
PN1	15	53	PN6	30	58
PN1	35	53	PN6	50	60
PN1	55	53	PN6	70	60
PN2A	30	56	PN6	90	58
PN2A	50	59	PN7	10	43
PN2A	70	60	PN7	30	47
PN2A	90	59	PN7	50	49
PN2A	110	59	PN7	70	55
PN2B	30	55	PN7	90	57
PN2B	50	57	PN7	110	57
PN2B	70	58	PN8	10	43
PN2B	90	57	PN8	30	46
PN2B	110	57	PN8	50	47
PN3	10	53	PN8	70	53
PN3	30	56	PN8	90	58
PN3	50	57	PN8	110	59
PN3	70	58	PN9	10	51
PN3	90	57	PN9	25	51
PN4	10	51	PN9	40	51

Figure 1 3D model of MPSC and its surroundings

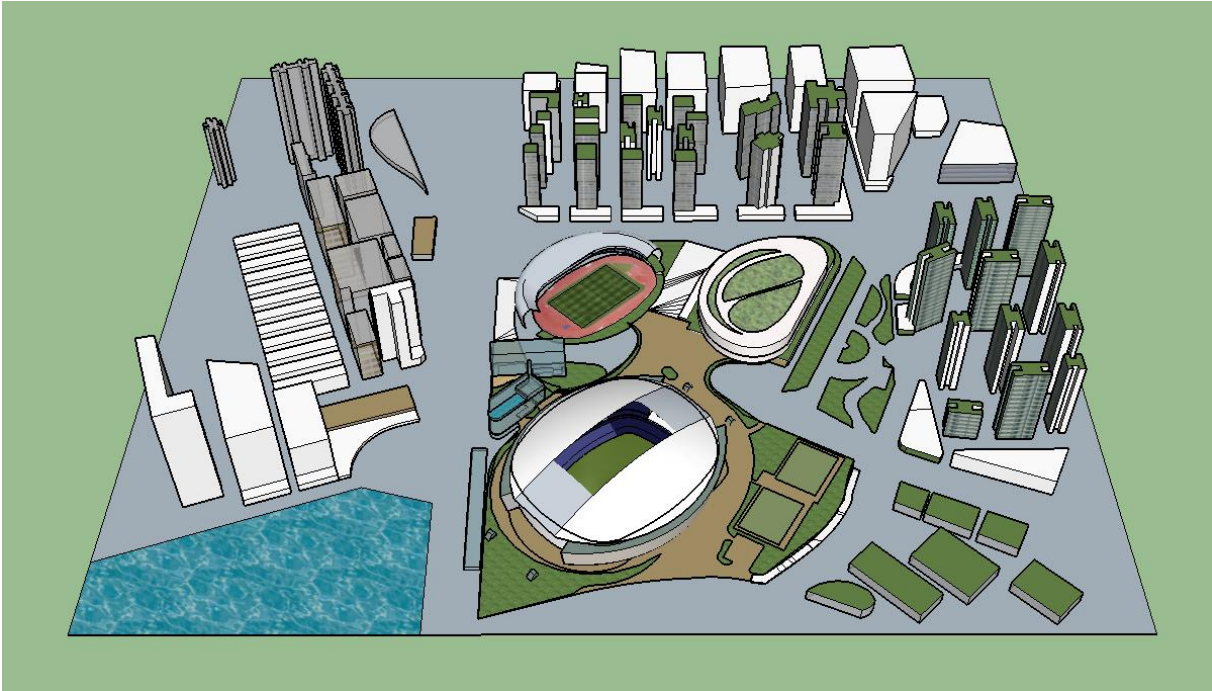


Figure 2 3D model of the Public Sports Ground

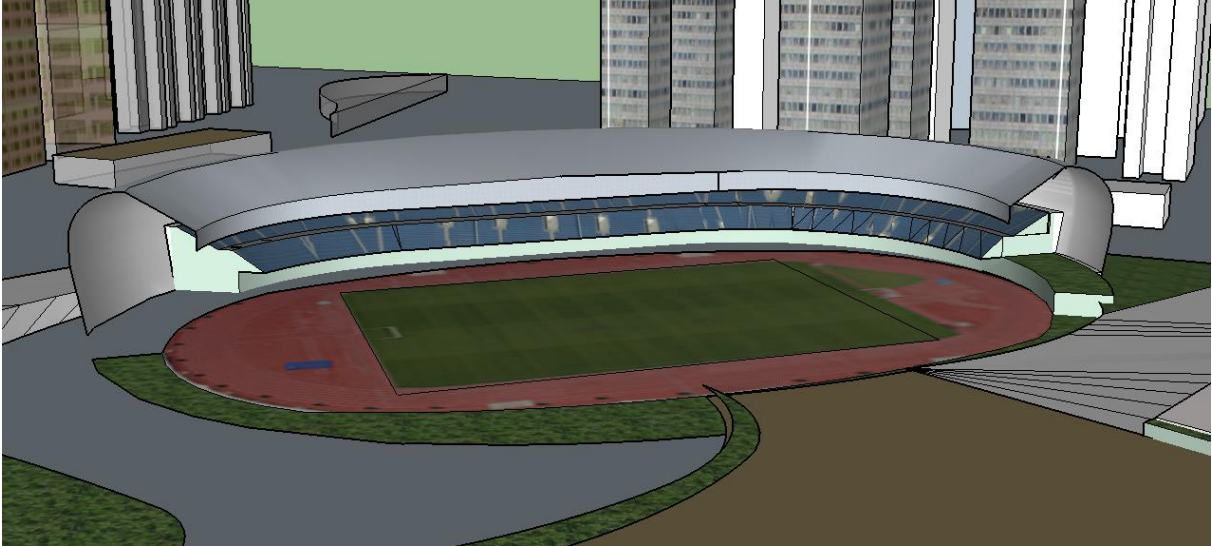


Figure 3 Frame view of noise model for MPSC and its surrounding

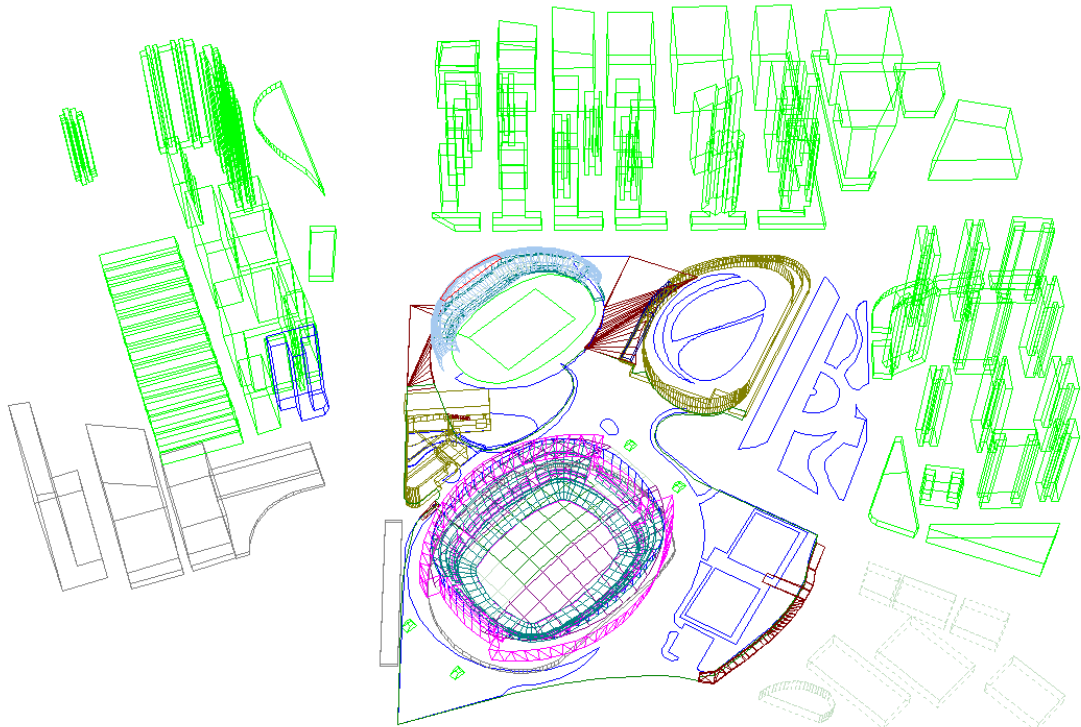


Figure 4 Frame view of noise model for Public Sports Ground

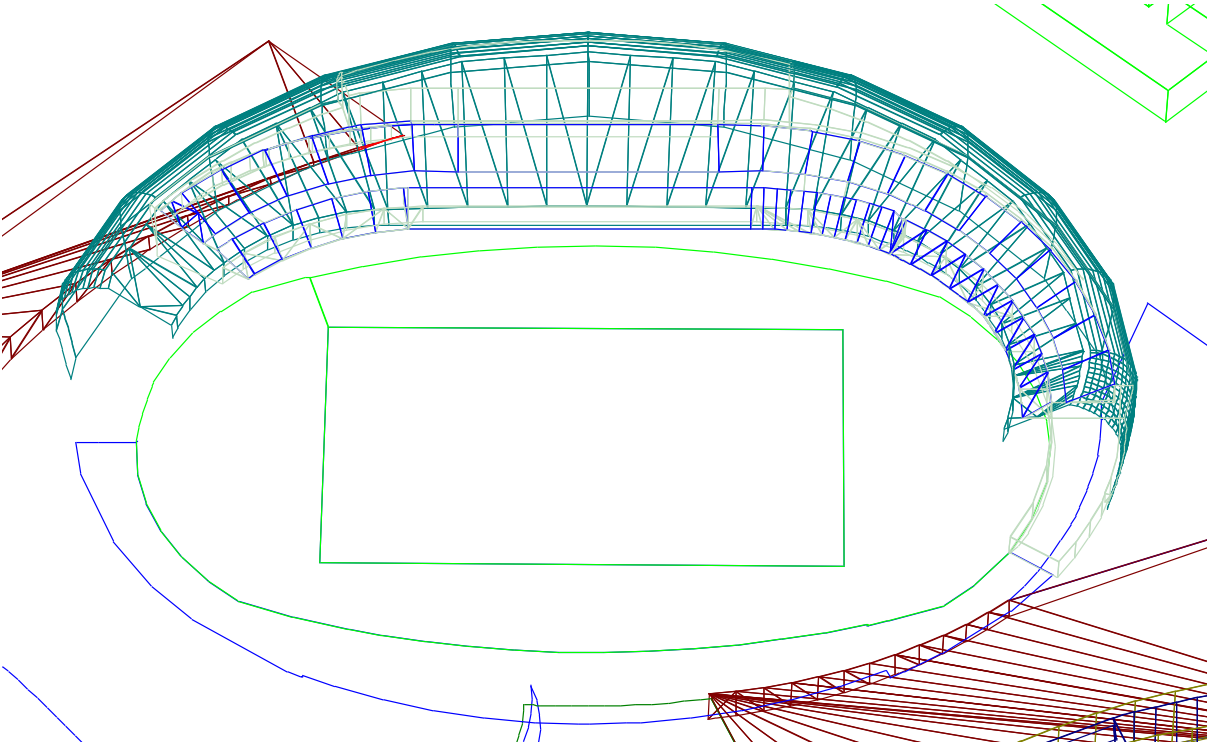


Figure 5 Positions and pointing directions of spectators
(red points indicate the location of the sources that represent spectators)

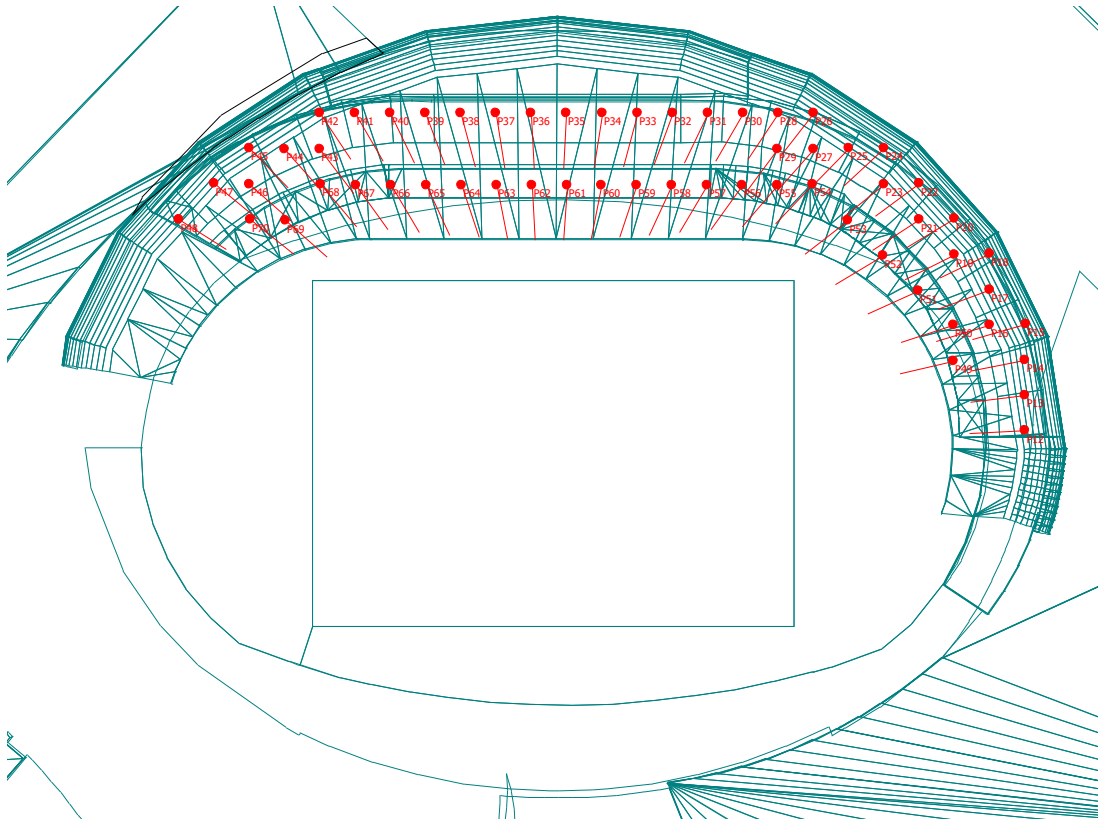


Figure 6 Positions and pointing directions of public address system loudspeakers
(red points indicate the location of the loudspeakers)

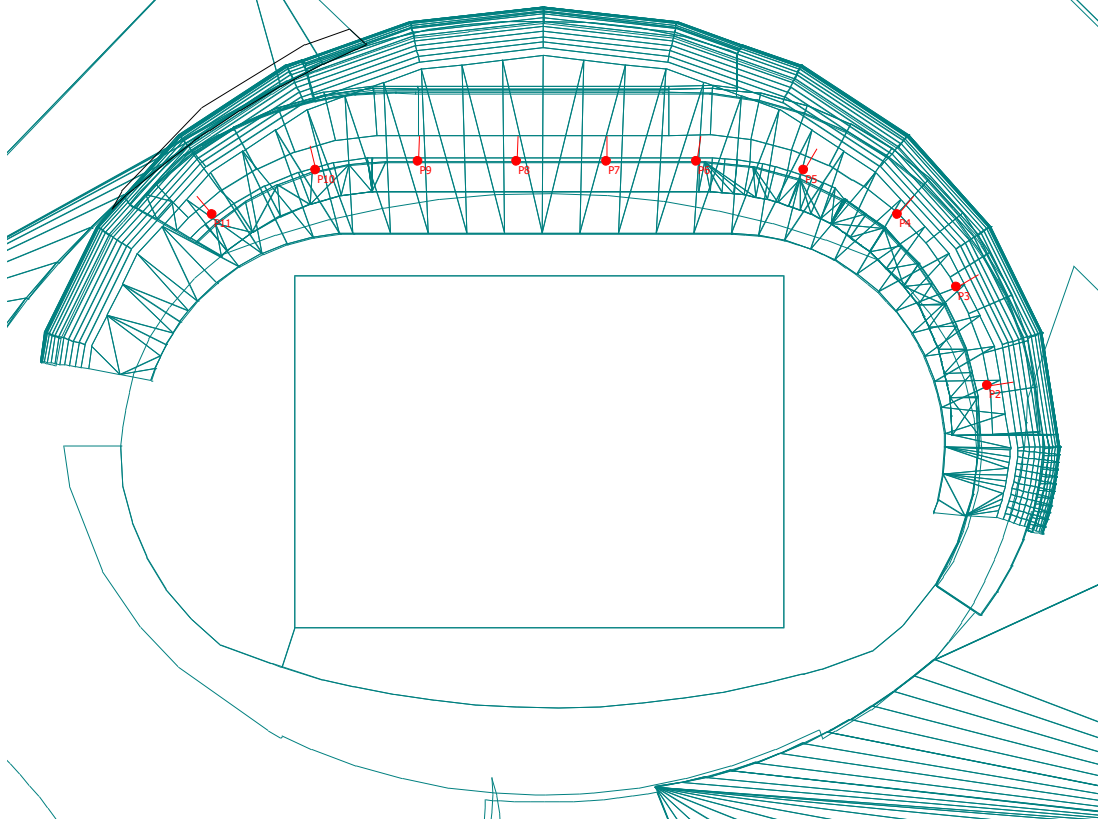
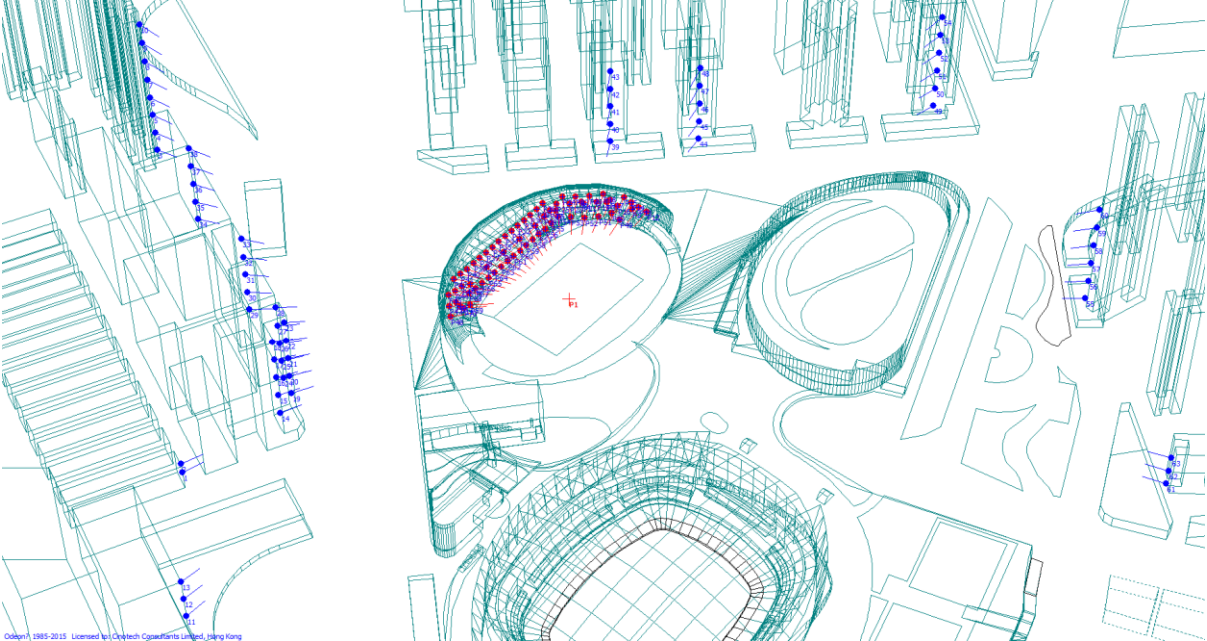


Figure 7 Location and height of the receivers in the noise model

(blue points indicate the location of the modelled receivers)



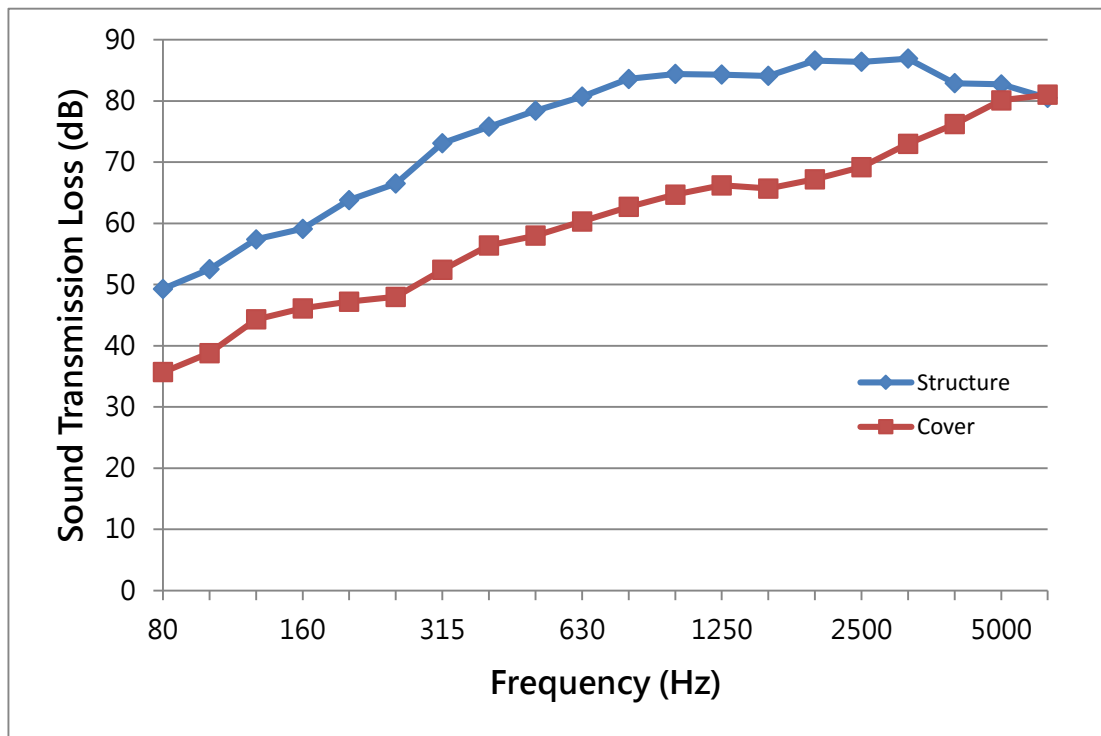
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Annex I Specifications of sound transmission loss adopted (in dB)

Frequency, Hz	80	100	125	160	200	250	315
Structure	49.3	52.5	57.4	59.1	63.8	66.5	73.1
Cover	35.7	38.8	44.3	46.1	47.2	48	52.4

Frequency, Hz	400	500	630	800	1000	1250	1600
Structure	75.8	78.4	80.7	83.6	84.4	84.3	84.1
Cover	56.4	58	60.3	62.7	64.7	66.2	65.7

Frequency, Hz	2000	2500	3150	4000	5000	6300
Structure	86.6	86.4	86.9	82.9	82.7	80.5
Cover	67.2	69.2	73	76.2	80.1	81



Appendix 5.4D

Noise Level Calibration of Acoustic Modelling Software

1 INTRODUCTION

- 1.1 To validate the results obtained with the acoustic modelling software, Odeon, the simulated results should be calibrated against measurement results.
- 1.2 In this appendix, the procedures for the calibration are described. The simulation results were compared with the measurement results to demonstrate the accuracy of the software.

2 RELEVANT EVENTS AND MEASUREMENTS

- 2.1 On-site measurements were conducted at the Mong Kok Stadium to obtain data for the calibration. Details of the event are listed in **Table 2-1**. Noise levels were recorded at the following locations in the Mong Kok Stadium:
- A) on the platform of the south stand;
 - B) on the western side of the roof of the ancillary facilities building behind the south stand (next to Flower Market Road);
 - C) on the eastern side of the roof of the ancillary facilities building;
 - D) at the ground level outside the stadium (near the western car park of the stadium).

The locations of measurements are indicated in **Figure 3-2**.

Table 2-1 Measured Event in Mong Kok Stadium

Event	2018 FIFA World Cup Qualifier: Hong Kong vs Qatar
Measurement Date	8 th September 2015
Measurement Time	21:15-21:45
Attendance	6396
Average Temperature and Relative Humidity at King's Park during the Event	27.0°C, 70.5%

- 2.2 The noise data collected were analysed and the Leq (30min) recorded are listed in **Table 2-2**. The background noise level was estimated to be 58.7 dB(A). The contribution due to background noise should be removed from the measured noise levels before comparing with the modelling results.

Table 2-2 Measured Noise Levels at different locations of Mong Kok Stadium

Location	A	B	C	D
Recorded SPL, dB(A)	83.0	71.7	71.3	62.7
SPL without background, dB(A)	83.0	71.5	71.0	60.4

- 2.3 The locations of measurement devices and the buildings of Mong Kok Stadium were photographed for record. This information served as a reference for modelling the noise propagation in the following section.

3 3D MODELLING

- 3.1 Acoustic modelling for the Mong Kok Stadium was performed, which took into account the building design. A 3D model of stadium and its surrounding was built according to photographic records of the stadium and information obtained from the Architectural Services Department. A view of the model is illustrated in **Figure 3-1**. Typical sound absorption and scattering properties for various building components were adopted in the model.
- 3.2 The spectators were represented by a number of point sources. 87 sources were distributed on the 4 spectator stands of Mong Kok Stadium in the model. As the event was a full-house event, the sources were evenly placed over the stands. They were configured to face towards the centre of the football field. Their sound power frequency spectrum and directivity profile were the same as in the models of MPSC in other sections of this EIA report.
- 3.3 The distribution of the sources and the location of the receivers (i.e. measurement points) can be found in **Figure 3-2** and **Figure 3-3** respectively. The sound power level per person was 85.4 dB(A), which was determined in **Appendix 5.4B**. The modelling results at the receivers are listed in **Table 3-2**.

Table 3-2 Modelling Results of the Event

[in unit dB(A)]	Simulated SPL	Measured SPL	Difference
Location A	85.4	83.0	2.4
Location B	76.3	71.5	4.8
Location C	76.9	71.0	5.9
Location D	61.3	60.4	0.9

- 3.4 The simulated results of Location D agreed with the measurements very well. The results of the other locations indicated some overestimation.

4 FINDINGS

- 4.1 To demonstrate the validity of the results from the acoustic modelling software Odeon used in the noise impact assessment of the MPSC, a calibration exercise has been implemented.
- 4.2 Noise measurement was done in a real life sports event held in a stadium. A 3D model of the stadium was built for the simulation of noise with the software Odeon.

- 4.3 The software Odeon results were close to or higher than the measured results. This calibration exercise indicated that the results from Odeon simulations were conservative.

Figure 3-1 3D model of Mong Kok Stadium and its surroundings

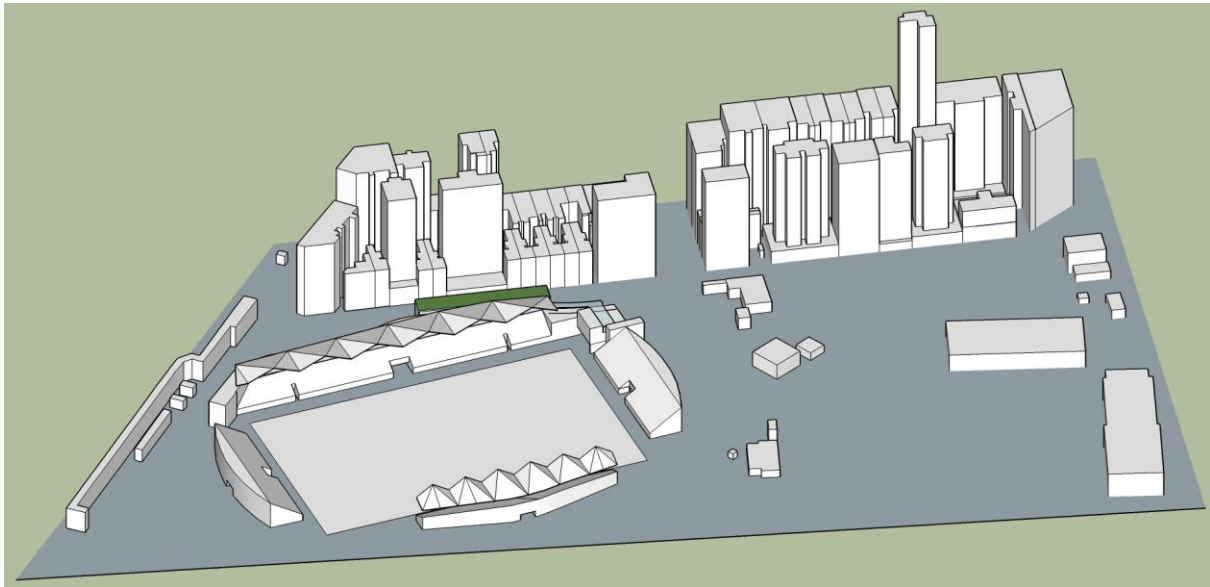


Figure 3-2 Location of measurement and corresponding receivers in the acoustic model

Blue points indicate the location of the modelled receivers corresponding to the measurement locations.

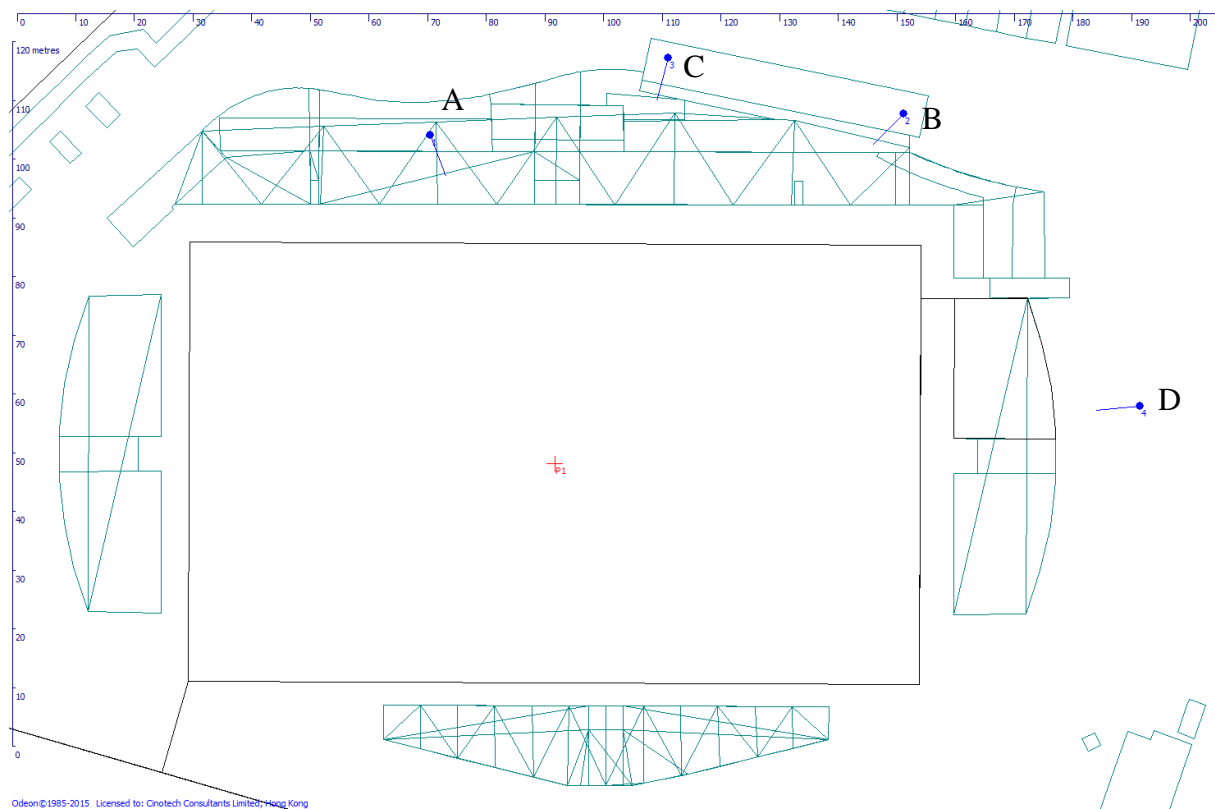
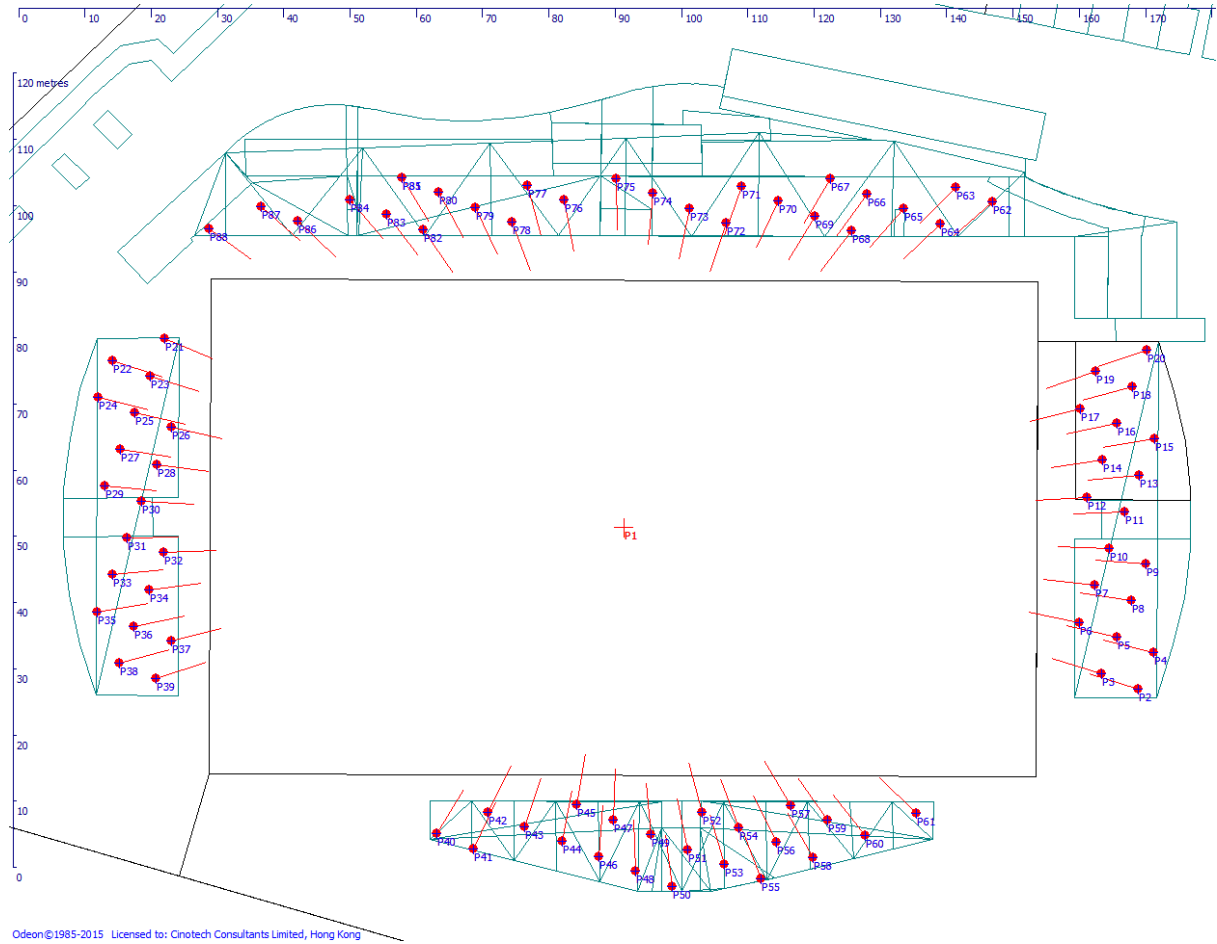


Figure 3-3 Location of the noise sources in the acoustic model

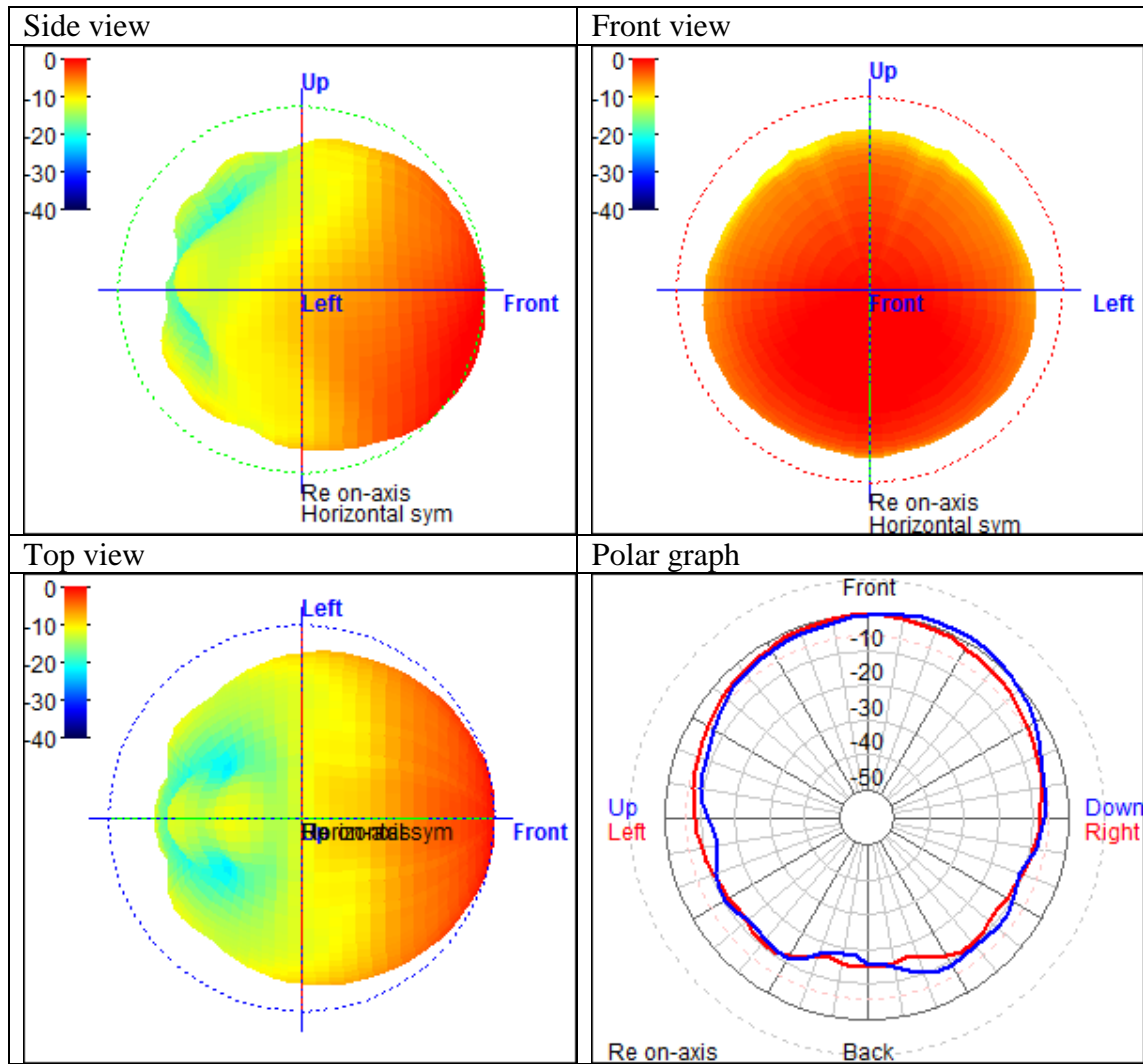
Red points indicate the location of the sources that represent spectators.



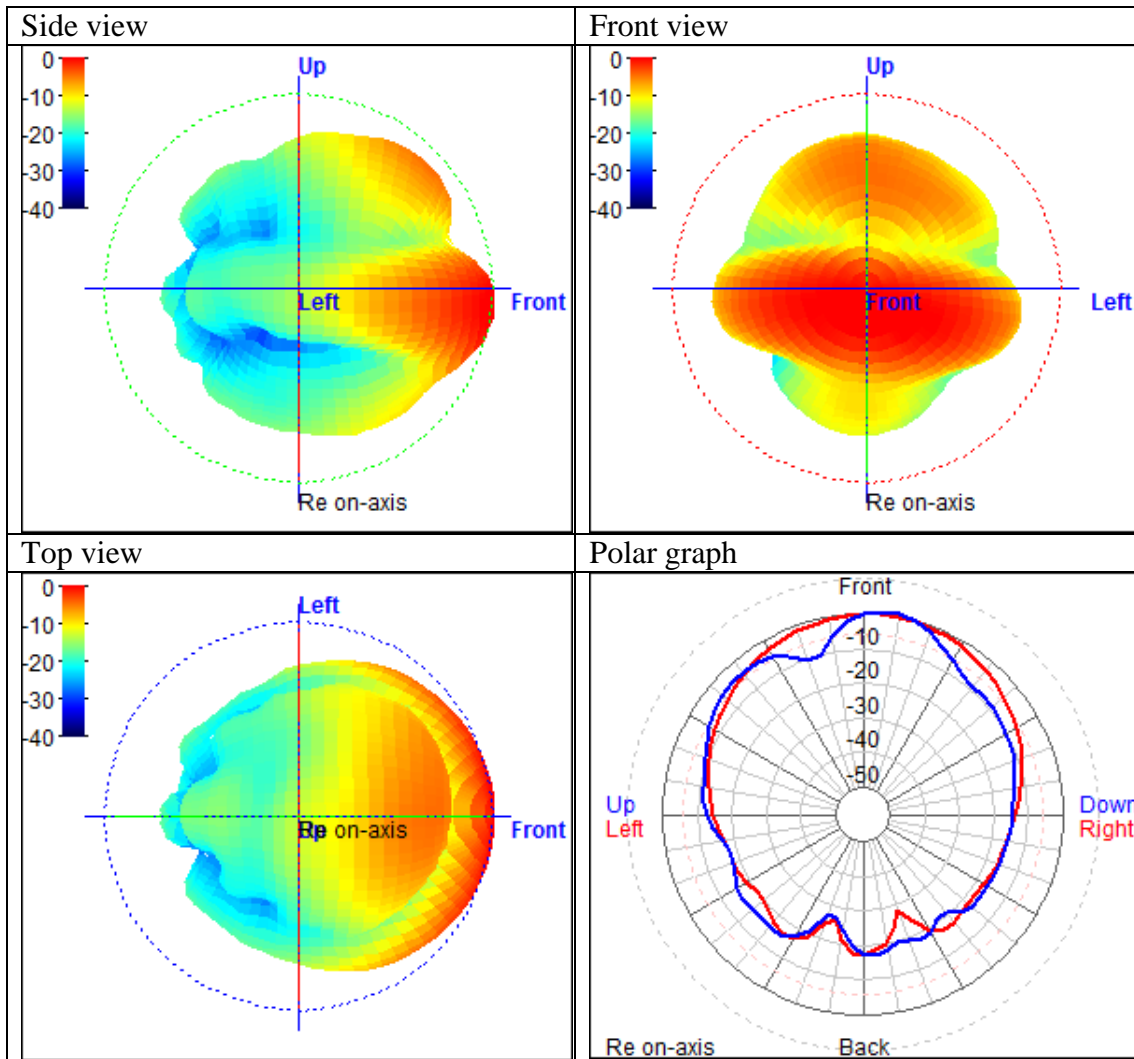
Appendix 5.4E

Directivity of Loudspeakers

Directivity profile of loudspeakers for sports event public announcement



Directivity profile of loudspeakers for musical concerts



Appendix 5.5

**Noise from Building Servicing and
Ventilation System Operation**

Appendix 5.5 – Noise from building servicing and ventilation system operation

Table 1 - SWL of the Air Handling Units, dB(A)

	Cooling Load (kW)	Cooling Load Ratio	Number of Air Handling Unit*	Total SWL, dB(A)
Main Stadium a	27216	33.6%	60	109.8
Main Stadium b	27216	33.6%	60	109.8
Public Sports Ground	2332	2.9%	5	99.0
Indoor Sport Centre	8501	10.5%	19	104.8
Commercial Area a	7914	9.8%	18	104.6
Commercial Area b	7914	9.8%	18	104.6
Total	81093	100%	180	

* Number of Air Handling Unit is calculated by the $ROUND(Cooling\ Load\ Ratio \times 180)$.

Table 2 - Distance from Air Handling Units to NSRs, m

	PN2B	PN5	PN7	PN8	PN9
Main Stadium a	292	402	490	415	395
Main Stadium b	424	506	535	395	310
Public Sports Ground	236	170	403	499	598
Indoor Sport Centre	523	270	166	144	301
Commercial Area a	120	377	548	544	563
Commercial Area b	172	448	598	563	553

Table 3 - Distance Attenuation and Façade Correction, dB(A)

	PN2B	PN5	PN7	PN8	PN9
Main Stadium a	-54.3	-57.1	-58.8	-57.3	-56.9
Main Stadium b	-57.5	-59.1	-59.5	-56.9	-54.8
Public Sports Ground	-52.4	-49.6	-57.1	-58.9	-60.5
Indoor Sport Centre	-59.4	-53.6	-49.4	-48.1	-54.6
Commercial Area a	-46.6	-56.5	-59.8	-59.7	-60.0
Commercial Area b	-49.7	-58.0	-60.5	-60.0	-59.8

Table 4 - Noise Level at Receivers, dB(A)

	PN2B	PN5	PN7	PN8	PN9
Main Stadium a	55.5	52.7	51.0	52.4	52.9
Main Stadium b	52.3	50.7	50.2	52.9	55.0
Public Sports Ground	46.5	49.4	41.9	40.0	38.5
Indoor Sport Centre	45.4	51.2	55.4	56.6	50.2
Commercial Area a	58.0	48.0	44.8	44.9	44.6
Commercial Area b	54.9	46.5	44.0	44.6	44.7
Total (Unmitigated)	61.9	58.0	58.1	59.5	58.3
Total (Mitigated)	46.9	43.0	43.1	44.5	43.3

Appendix 5.6

**Assessment Report for Noise Impact from
Crowd Dispersion at Public Places**

1. INTRODUCTION

To assess noise caused by crowd dispersion from the Main Stadium after 11:00 p.m., a study was carried out in February 2016 from 23:00 to shortly after mid-night at Causeway Bay near the Victoria Park Flower Market which had a comparable scale and dispersal nature in order to gauge the impact of human activity noise on noise sensitive receivers along the dispersion routes. This report presents the observations and findings of the study.

2. STUDY METHODOLOGY

Experience and Qualification of Study Team

The study was carried out by two well qualified acoustic professionals with normal auditory sense, namely: Dr. HF Chan and Mr. KS Lee. Dr. Chan is a Fellow member of the Hong Kong Institute of Acoustic and a renowned acoustic professional with over 33 years in environmental management, including noise. Mr. Lee is also a member of the Hong Kong Institute of Acoustic and an experienced acoustic professional with over 20 years in environmental management including noise. Both of them have been involved in various EIA and noise studies in Hong Kong.

Venue, Date and Time

In order to assess the noise at a representative or probably a worst-affected dwelling from human activity noise along the dispersion route, a venue was chosen that would satisfy the following criteria:

- (a) The location should not be unduly affected by traffic noise.
- (b) The location should preferably be at a height equivalent to the fourth floor of a normal building without podium in order to simulate the lowest receiver height along the planned development along the Station Square (noise sensitive receiver where the noise sensitive receivers would be closest to one of the dispersal routes).
- (c) The location should be accessible by the study team members.
- (d) The location should be along the route where people either enter or leave the Victoria Park Flower Market.

Prior to the investigation, a site survey was conducted to ascertain the accessibility of the noise sensitive receivers along the roads with special traffic arrangement near the flower market during opening of the market. Apart from a few low-rise residential buildings with no ground-level gate along Lockhart Road (between East Point Road and Cannon Street), no access could be gained to other receivers with similar external environment. Typically, these few buildings at Lockhart Road were unaffected by traffic noise because of the special traffic arrangement and have openings at the staircase to simulate the effect of an opened window in a residential unit. In view of this, a residential building at No. 541 of Lockhart Road was selected for the assessment. The road was one of the crowd dispersal routes that were closed for pedestrian access only during the market opening period. The assessment level at 4/F was chosen. The assessments were conducted on 5th and 7th of February 2016 from 23:00 to 00:00 at 4/F of the staircase of the residential building.

3. RESULTS

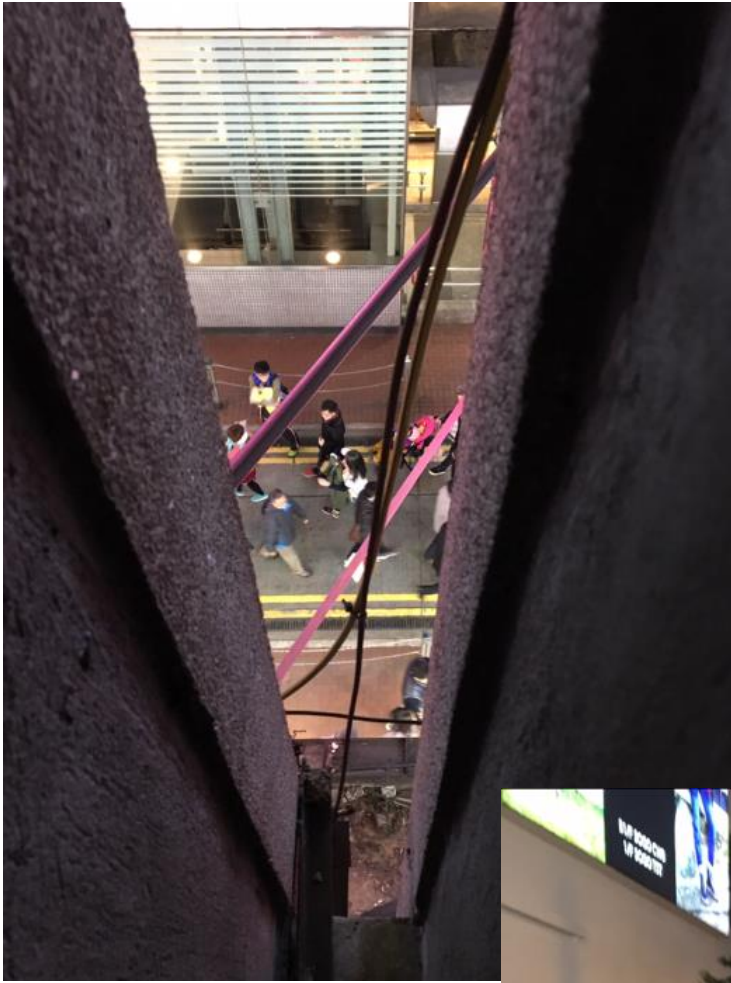
The perception of the acoustic professionals was that the crowd noise was audible, especially if someone paid attention to the noise during the investigation period. No raised voice was heard during the investigation. However, the crowd noise was not considered intolerable considering the use of the noise sensitive uses affected and the time. It was found that noise from the people on the streets was not a source of annoyance to the local residents.

4. CONCLUSION

Based on the observation and on-site perception of the two professionals, noise from the people on the streets was not a source of annoyance to the local residents.

5. PHOTOGRAPHS





Appendix 6A

**Relevant Environmental and Safety
Standards for Marine Transportation**

Appendix 6A

Relevant environmental and safety standards for marine transportation

1. Under Environmental Protection Department
 - 1.1 Dumping at Sea Ordinance (Cap 466)
 - a. EPD Guidance Note No. 1/2006
 - b. BD ADV-21 (PNAP 252)
 - c. ETWB TC (Works) 34/2002
2. Marine Department
 - 2.1 Port Control (Cargo Working Areas) Ordinance (Cap 81)
 - 2.2 Shipping and Port Control Ordinance (Cap 313)
 - 2.3 Merchant Shipping (Safety) Ordinance (Cap 369)
 - 2.4 Merchant Shipping (Prevention and Control of Pollution) Ordinance (Cap 413)
 - 2.5 Merchant Shipping (Local Vessels) Ordinance (Cap 548)
 - 2.6 All workers, including supervising staff shall have completed training on Shipping Cargo Handling Basic Training Course to Shipping and Port Control Ordinance (Cap 313) and Merchant Shipping (Local Vessels) Ordinance (Cap 548)

Appendix 6B

Practice Notes ProPECC PN 1/94 and APP-46

**ENVIRONMENTAL PROTECTION DEPARTMENT
PRACTICE NOTE FOR PROFESSIONAL PERSONS**

Construction Site Drainage

Introduction

The purpose of this practice note is to provide some basic environmental guidelines for the handling and disposal of construction site discharges. It is hoped that through the issuance of this practice note, some of the pollution problems currently associated with construction activities can be prevented or minimized, for example :

- (i) siltation in storm drains caused by excessive sand and silt in the storm run-off;
- (ii) visual nuisance and hazard to aquatic life caused by discharge of muddy water into streams or the sea;
- (iii) pollution caused by improper handling and disposal of other types of construction site wastewater such as sewage from site toilets.

A total of ten types of discharges from construction sites have been identified. Good practice for dealing with these discharges is provided in the following sections.

Surface Run-off

2. Surface run-off from construction sites should be discharged into storm drains via adequately designed sand/silt removal facilities such as sand traps (see Appendix A1 for reference), silt traps and sediment basins. Channels or earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Perimeter channels at site boundaries should be provided where necessary to intercept storm run-off from outside the site so that it will not wash across the site. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks.

3. Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly, at the onset of and after each rainstorm

to ensure that these facilities are functioning properly at all times.

4. Construction works should be programmed to minimize soil excavation works in rainy seasons (April to September). If excavation in soil could not be avoided in these months or at any time of year when rainstorms are likely, for the purpose of preventing soil erosion, temporarily exposed slope surfaces should be covered e.g. by tarpaulin, and temporary access roads should be protected by crushed stone or gravel, as excavation proceeds. Intercepting channels should be provided (e.g. along the crest/edge of excavation) to prevent storm runoff from washing across exposed soil surfaces. Arrangements should always be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm.

5. Earthworks final surfaces should be well compacted and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate drainage like intercepting channels should be provided where necessary.

6. Measures should be taken to minimize the ingress of rainwater into trenches. If excavation of trenches in wet seasons is necessary, they should be dug and backfilled in short sections. Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.

7. Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on sites should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.

8. Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers. Discharge of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.

9. Precautions to be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecast and actions to be taken during or after rainstorms are summarized in Appendix A2 for easy reference.

Groundwater

10. Groundwater pumped out of wells, etc. for the lowering of ground water level in basement or foundation construction, and groundwater seepage pumped out of tunnels or caverns under construction should be discharged into storm drains after the removal of silt in silt removal facilities.

Boring and Drilling Water

11. Water used in ground boring and drilling for site investigation or rock/soil anchoring should as far as practicable be recirculated after sedimentation. When there is a need for final disposal, the wastewater should be discharged into storm drains via silt removal facilities.

Wastewater from Concrete Batching & Precast Concrete Casting

12. Wastewater generated from the washing down of mixer trucks and drum mixers and similar equipment should wherever practicable be recycled. The discharge of wastewater should be kept to a minimum.

13. To prevent pollution from wastewater overflow, the pump sump of any water recycling system should be provided with an on-line standby pump of adequate capacity and with automatic alternating devices.

14. Under normal circumstances, surplus wastewater may be discharged into foul sewers after treatment in silt removal and pH adjustment facilities (to within the pH range of 6 to 10). Disposal of wastewater into storm drains will require more elaborate treatment. Surface run-off should be segregated from the concrete batching plant and casting yard area as much as possible, and diverted to the stormwater drainage system. Surface run-off contaminated by materials in a concrete batching plant or casting yard should be adequately treated before disposal into stormwater drains.

Wheel Washing Water

15. All vehicles and plant should be cleaned before they leave a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. A wheel washing bay should be provided at every site exit if practicable and wash-water should have sand and silt settled out or removed before discharging into storm drains. The section of construction road between the wheel washing bay and the public road should be paved with backfall to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains.

Bentonite Slurries

16. Bentonite slurries used in diaphragm wall and bore-pile construction should be reconditioned and reused wherever practicable. If the disposal of a certain residual quantity cannot be avoided, the used slurry may be disposed of at the marine spoil grounds subject to obtaining a marine dumping licence from EPD on a case-by-case basis.

17. If the used bentonite slurry is intended to be disposed of through the public drainage system, it should be treated to the respective effluent standards applicable to foul sewers, storm drains or the receiving waters as set out in the WPCO Technical Memorandum on Effluent Standards.

Water for Testing & Sterilization of Water Retaining Structures and Water Pipes

18. Water used in water testing to check leakage of structures and pipes should be reused for other purposes as far as practicable. Surplus unpolluted water could be discharged into storm drains.

19. Sterilization is commonly accomplished by chlorination. Specific advice from EPD should be sought during the design stage of the works with regard to the disposal of the sterilizing water. The sterilizing water should be reused wherever practicable.

Wastewater from Building Construction

20. Before commencing any demolition works, all sewer and drainage connexions should be sealed to prevent building debris, soil, sand etc. from entering public sewers/drains.

21. Wastewater generated from building construction activities including concreting, plastering, internal decoration, cleaning of works and similar activities should not be discharged into the stormwater drainage system. If the wastewater is to be discharged into foul sewers, it should undergo the removal of settleable solids in a silt removal facility, and pH adjustment as necessary.

Acid Cleaning, Etching and Pickling Wastewater

22. Acidic wastewater generated from acid cleaning, etching, pickling and similar activities should be neutralized to within the pH range of 6 to 10 before discharging into foul

sewers. If there is no public foul sewer in the vicinity, the neutralized wastewater should be tankered off site for disposal into foul sewers or treated to a standard acceptable to storm drains and the receiving waters.

Wastewater from Site Facilities

23. Sewage from toilets, kitchens and similar facilities should be discharged into a foul sewer. If there is no foul sewer in the vicinity, a septic tank and soakaway system (see Appendix B, these guidelines are for interim reference only as they are currently under review by Government) or for large flows, a sewage treatment plant will have to be provided. For sites where there are only toilet wastes arising, the use of chemical toilets may also be considered if a septic tank and soakaway system is found to be not feasible.

24. Wastewater collected from canteen kitchens, including that from basins, sinks and floor drains, should be discharged into foul sewers via grease traps capable of providing at least 20 minutes retention during peak flow. Details of a typical grease trap are given at Appendix C for reference.

25. Drainage serving an open oil filling point should be connected to storm drains via a petrol interceptor with peak storm bypass (see Appendix D for reference).

26. Vehicle and plant servicing areas, vehicle wash bays and lubrication bays should as far as possible be located within roofed areas. The drainage in these covered areas should be connected to foul sewers via a petrol interceptor (see Appendix E for reference). Oil leakage or spillage should be contained and cleaned up immediately. Waste oil should be collected and stored for recycling or disposal in accordance with the Waste Disposal Ordinance.

Licensing of Construction Site Discharges within Water Control Zones

27. All discharges into any drainage or sewerage systems, or inland or coastal waters, or into the ground (e.g. from septic tanks) within a Water Control Zone are controlled under the Water Pollution Control Ordinance (WPCO), except the discharge of domestic sewage into foul sewers or the discharge of unpolluted water into storm drains or into the waters of Hong Kong. Construction site discharges are controlled under the WPCO. The geographical extents of the Water Control Zones are shown on the map at Appendix F.

28. Discharges controlled under the WPCO must comply with the terms and conditions of a valid WPCO licence. It should be noted that compliance with the recommendations in this practice note does not necessarily imply compliance with the terms and conditions of a licence issued under the WPCO. Depending on actual site conditions, facilities in addition to those recommended in this practice note might be necessary.

29. The WPCO licence application form (Form A) can be obtained from any EPD office or from District Offices. The applicant should include in the application, inter alia, information on the various points of discharge of storm run-off and wastewater, and the corresponding maximum (or range of) volume of discharge expected on a dry day. The application form, which can be filled in by the Owner, the Authorized Person, the Consulting Engineer or the Contractor, should be submitted to EPD as early as possible before the commencement of any discharge. In general, assuming adequate information has been provided together with the licence application, EPD would need at least 20 days for the processing of a licence for a discharge, and in the case of a discharge directly into any waters of Hong Kong, EPD would need at least 50 days to allow time for public notification as required by the WPCO. (EPD General Enquiry 835 1018)

(Stuart B. Reed)

Director of Environmental Protection

Environmental Protection Department
28/F Southorn Centre
130 Hennessy Road
Wan Chai

Issued August 1994

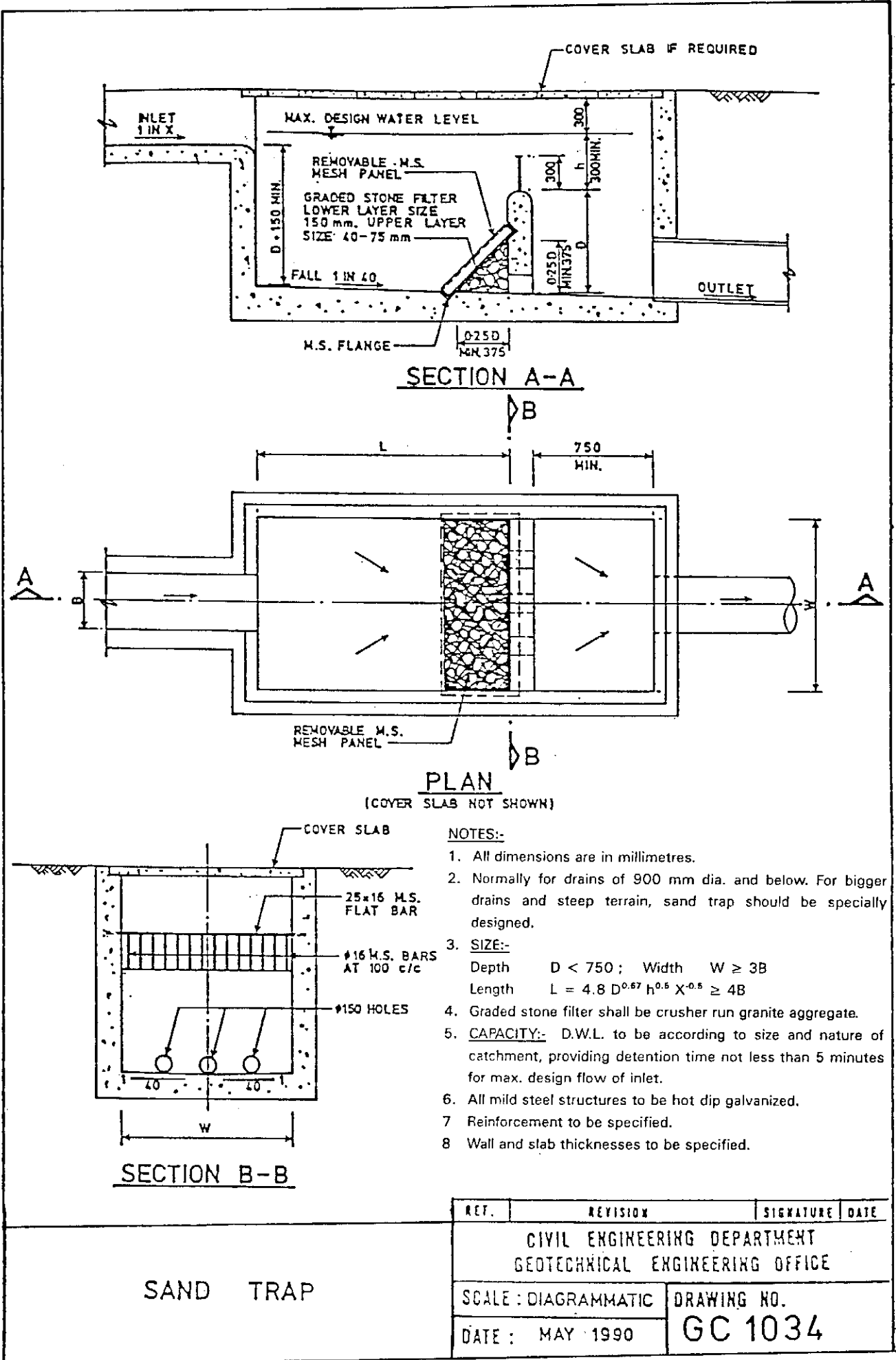
Ref. : EP 50/D1/4

LIST OF APPENDICES

Appendix A1	:	Sand Trap (CED Standard Drawing No. GC 1034)
Appendix A2	:	Precautions/Actions relating to Rainstorms
Appendix B	:	Septic Tank and Soakaway
Appendix C	:	Grease Trap
Appendix D	:	Petrol Interceptor with Storm Bypass
Appendix E	:	Petrol Interceptor
Appendix F	:	Water Control Zones

Addendum to the ProPECC Practice Note PN 1/94

Original	Amendments
Para 29, last sentence “(EPD General Enquiry 835 1018)”	“(EPD General Enquiry 2835 1018)”



SECTION A-A

PLAN

(COVER SLAB NOT SHOWN)

SECTION B-B

NOTES:-

1. All dimensions are in millimetres.
2. Normally for drains of 900 mm dia. and below. For bigger drains and steep terrain, sand trap should be specially designed.
3. **SIZE:-**
 Depth $D < 750$; Width $W \geq 3B$
 Length $L = 4.8 D^{0.67} h^{0.5} X^{-0.5} \geq 4B$
4. Graded stone filter shall be crusher run granite aggregate.
5. **CAPACITY:-** D.W.L. to be according to size and nature of catchment, providing detention time not less than 5 minutes for max. design flow of inlet.
6. All mild steel structures to be hot dip galvanized.
7. Reinforcement to be specified.
8. Wall and slab thicknesses to be specified.

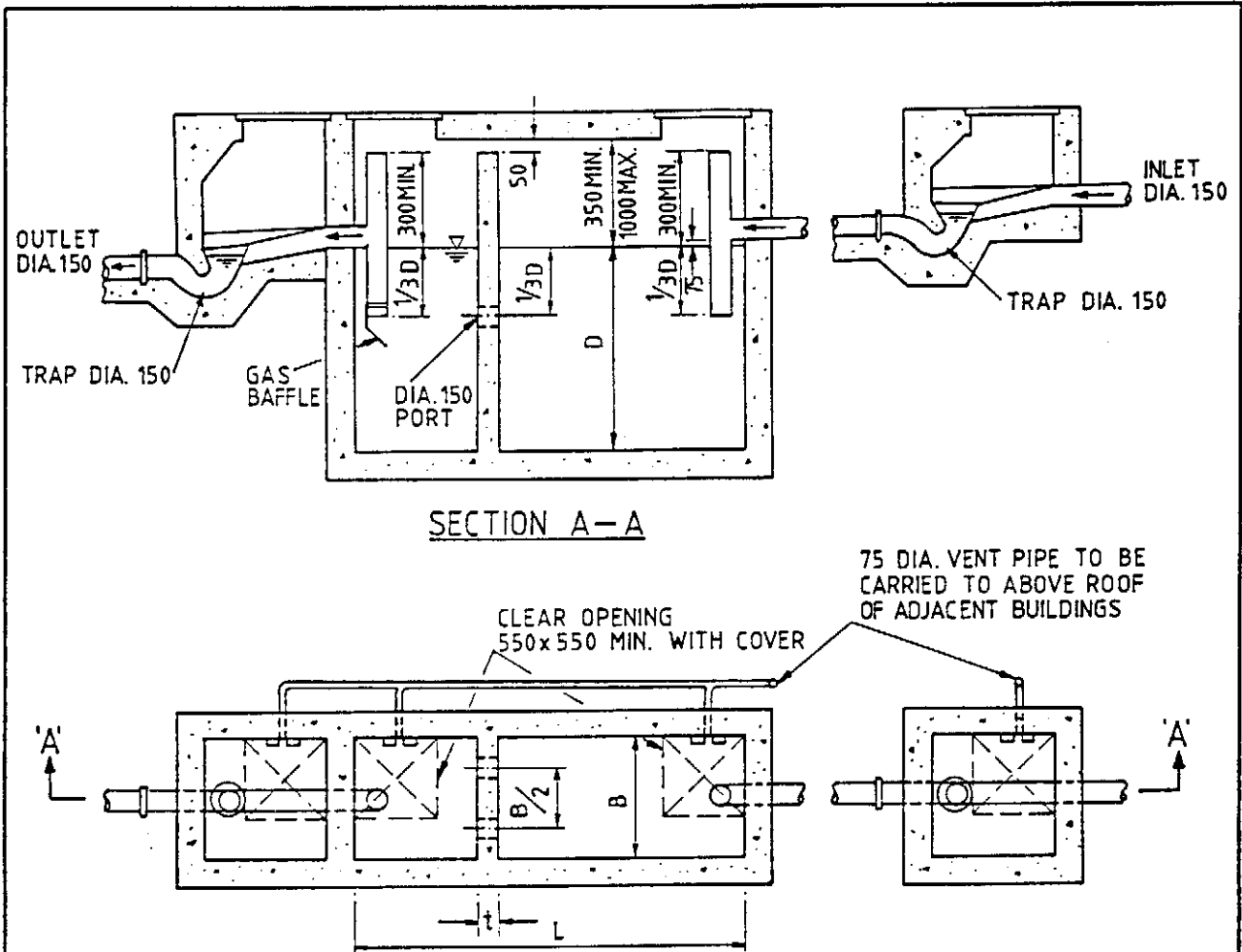
SAND TRAP

REF.	REVISION	SIGNATURE	DATE
CIVIL ENGINEERING DEPARTMENT GEOTECHNICAL ENGINEERING OFFICE			
SCALE : DIAGRAMMATIC		DRAWING NO.	
DATE : MAY 1990		GC 1034	

Precautions/Actions relating to Rainstorms

The following are extracted from the main text to highlight the specific precautions or actions concerned with rainstorms. For general precautions to be taken at all times in relation to surface run-off, please refer to Section 2 of the main text.

- (I) Precautions to be taken at any time of year when rainstorms are likely
- (a) Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly.
 - (b) Temporarily exposed slope surfaces should be covered e.g. by tarpaulin.
 - (c) Temporary access roads should be protected by crushed stone or gravel.
 - (d) Intercepting channels should be provided (e.g. along the crest/edge of excavation) to prevent storm runoff from washing across exposed soil surfaces.
 - (e) Trenches should be dug and backfilled in short sections. Measures should be taken to minimize the ingress of rainwater into trenches.
- (II) Actions to be taken when a rainstorm is imminent or forecast
- (a) Silt removal facilities, channels and manholes should be checked to ensure that they can function properly.
 - (b) Open stockpiles of construction materials (e.g. aggregates, sand and fill materials) on site should be covered with tarpaulin or similar fabric.
 - (c) All temporary covers to slopes and stockpiles should be secured.
- (III) Actions to be taken during or after rainstorms
- (a) Silt removal facilities, channels and manholes should be checked and maintained to ensure satisfactory working conditions. Attention should be given to safety when carrying out this work.




SECTION A-A

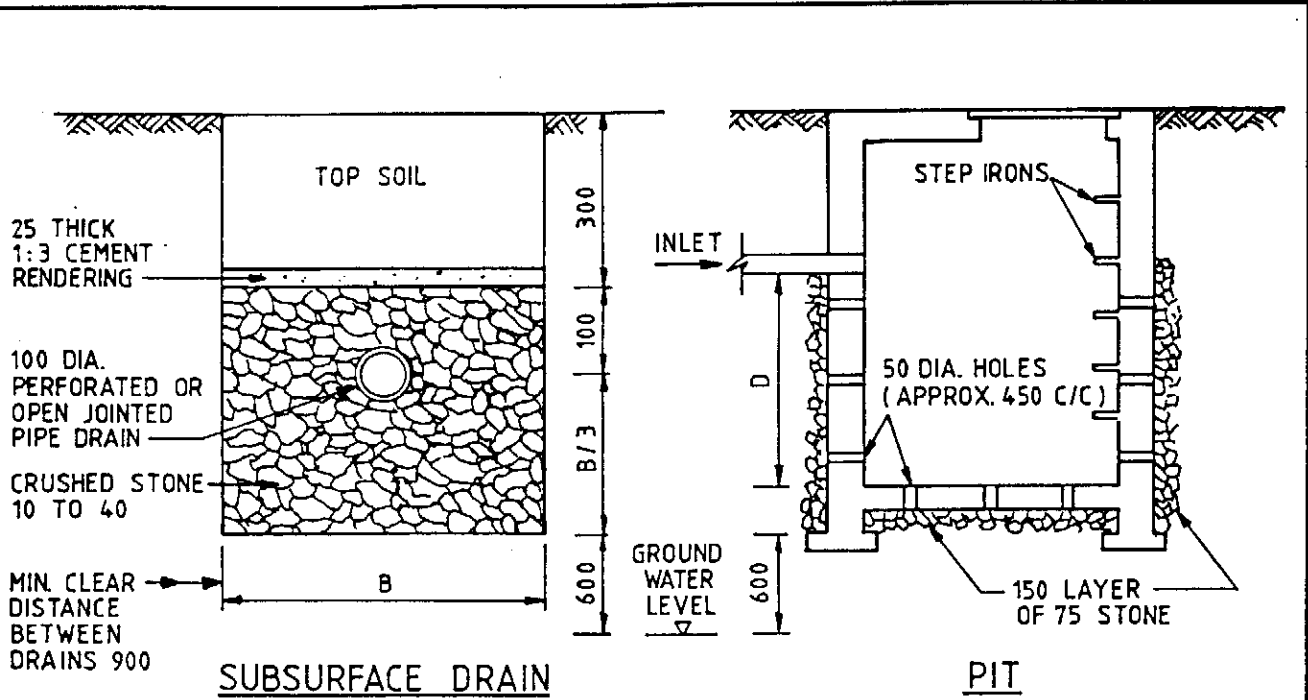
PLAN

NOTES:-

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
2. SIZE
 - a. $4B > L > 3B$
 - b. $1800 \text{ mm} > D > 1200 \text{ mm}$
 - c. RATIO OF VOLUMES OF FIRST AND SECOND CHAMBERS = 2 : 1
3. CAPACITY (SUBJECT TO NOTE 2)
 - a. CAPACITY $C = (L - t) \times B \times D$
 - b. NOT LESS THAN 2.3 m^3 BUT NOT MORE THAN 41 m^3
 - c. NOT LESS THAN $0.1N$ WHERE N IS THE NUMBER OF PERSONS SERVED AND Q IS THE ESTIMATED ULTIMATE PER CAPITA DAILY WATER CONSUMPTION
 - d. SURFACE WATER MUST NOT BE CONNECTED TO THE TANK
 - e. TANK TO BE DESLUDGED EVERY 6 MONTHS
4. NO OVERFLOW OR BYPASS PIPE IS ALLOWED.
5. PLEASE REFER TO THE BOOKLET "GUIDANCE NOTES ON DISCHARGES FROM VILLAGE HOUSES" PUBLISHED BY EPD FOR FURTHER GUIDELINES ON OPERATION AND MAINTENANCE OF SEPTIC TANK SYSTEM.

SEPTIC TANK
(FOR INTERIM REFERENCE ONLY)

drawing no. EP 50/D1/5/01		group Liquid Waste Projects	
date 5/93	scale NTS	ENVIRONMENTAL PROTECTION DEPARTMENT HONG KONG	



NOTES:-

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED
2. PERCOLATION TEST FOR DETERMINING ABSORPTION CAPACITY OF SOIL
 - a. EXCAVATE A HOLE 300 mm SQUARE TO THE SAME DEPTH OF THE PIT OR TRENCH.
 - b. FILL THE HOLE WITH APPROXIMATELY 150 mm OF WATER AND ALLOW TO SEEP AWAY COMPLETELY.
 - c. REFILL THE HOLE WITH WATER TO A DEPTH OF 150 mm AND OBSERVE THE TIME, IN MINUTES, FOR WATER TO SEEP COMPLETELY AWAY.
 - d. DIVIDE THE TIME BY 6 TO GIVE TIME TAKEN TO FALL 25 mm FOR USE IN TABLE BELOW.
3. ALLOWABLE LOADING OF SOAKAWAY SYSTEMS

TIME IN MINUTES FOR WATER TO FALL 25 mm IN TEST PIT	ALLOWABLE LOADING IN LITRES PER m ² PER DAY	
	DRAIN TRENCH BOTTOM AREA	PIT PERCOLATION AREA
1 OR LESS	163	216
2	130	175
5	98	130
10	89	94
30	33	45

THE TOTAL ALLOWABLE LOADING PER DAY SHOULD EQUATE WITH THE DAILY INCOMING FLOW

4. MINIMUM CLEARANCE REQUIREMENTS FOR SOAKAWAY SYSTEMS

	DISTANCE FROM SOAKAWAY SYSTEMS (m)	
BUILDING	3	
RETAINING WALLS	6	
WELLS	50	
STREAM WHERE THE BED IS LOWER THAN INVERT OF SOAKAWAY SYSTEM	15 (30)*	* THESE DISTANCES SHOULD BE INCREASED TO DISTANCES SHOWN IN BRACKETS IF THE WATER FROM THE STREAM OR POOL IS USED OR LIKELY TO BE USED FOR DRINKING OR DOMESTIC PURPOSES.
POOLS	7.5 (30)*	
CUTS OR EMBANKMENTS	30	
PATHS	1.5	
BEACHES	100	(FROM BOUNDARIES OF GAZETTED BEACHES OR BATHING BEACH SUBZONES OF WATER CONTROL ZONES)
	30	(FROM H.W.M. AND FROM NEAREST WATERCOURSES FOR OTHER CASES)
GROUND WATER TABLE	0.6	(BELOW INVERT)

<h2>SOIL SOAKAWAY SYSTEM</h2> <p>(FOR INTERIM REFERENCE ONLY)</p>	drawing no. EP 50/D1/5/02	group Liquid Waste Projects
	date 5/93	scale NTS

Grease Traps

(see Drawing no. EP 50/L1/1/01A for typical details of a grease trap)

<u>Kitchen Floor Area</u> (m ²)	<u>Peaking Factor</u>	<u>Minimum Required Grease Trap Retention Volume</u> (m ³)
12	5.5	0.7
24	4.3	1.1
50	3.0	1.6
100	2.4	2.5
150		3.3
200	1.85	4.0
250		4.7
300		5.4
350		6.1
400	1.62	6.7
450		7.3
500		7.8
550		8.3
600	1.38	8.7
650		9.1
700		9.4
750		9.7
800	1.15	10.0
850		10.2
900	1.03	10.3
1000	1.0	10.4

- Note
1. The minimum required grease trap retention volume tabulated above is based on an average water consumption of 0.5 m³ per day per m² of kitchen floor area, and an average working day of 16 working hours. A larger grease trap should be provided if a higher water discharge intensity is anticipated.
 2. For kitchen floor areas in between the listed values, the minimum required grease trap retention volume can be calculated pro-rata.
 3. For kitchen floor areas smaller than 12 m², a grease trap with retention volume 0.7 m³ should be provided unless the adequacy of a smaller grease trap can be demonstrated.
 4. Depending on the actual operation of the proposed food premises, additional installations might be required to meet the standards given in the Technical Memorandum issued under section 21 of the Water Pollution Control (Amendment) Ordinance 1990.

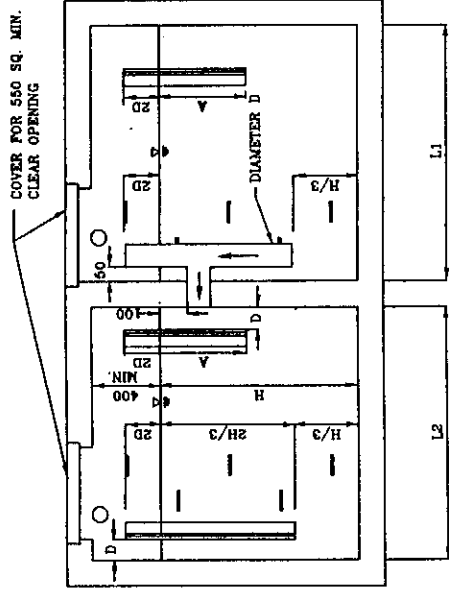
Notes

1. All dimensions are in millimetres unless otherwise stated.
2. Volume = $B(L_1 + L_2)H$
3. $750 \leq B \leq L_1 \leq L_2 \leq 1800$
4. $600 \leq H \leq 1200$
For kitchen floor areas $\geq 50 \text{ m}^2$, H should be 900 minimum.
5. $L_1 + L_2 = L_T$
 $2.0 \leq L_T/H \leq 3.0$
 $1500 \leq B \times L_T/H \leq 4000$
6. $A = H/2$ but not greater than 450
7. No. of pipes through the middle partition wall should be such that the velocity inside the pipes is not greater than 0.2 m/s
8. Gradient of inlet pipe ≥ 1 in 10
9. Horizontal pipe between the last drainage funnel and the grease trap should not be longer than 10m. Where this cannot be achieved, the gradient of the pipe should be increased and rodding eyes should also be provided
10. Minimum diameter of inlet pipes 100mm
11. Minimum diameter of vent pipes 75mm
12. Reinforced concrete grease traps should be designed as liquid retaining structure with maximum surface crack widths 0.2mm
13. Grease traps should be easily accessible, allowing covers to be lifted and accumulated materials removed
14. A prominent sign should be erected adjacent to the grease trap to signify the location of the grease trap and should also contain the following information:
 - a) overall depth of the grease trap
 - b) liquid depth of the grease trap
 - c) the grease trap needs cleaning when the top 200mm of liquid depth is occupied by grease
 - d) warning signs and safety barriers should be erected around the manhole openings during cleaning and maintenance of the grease trap

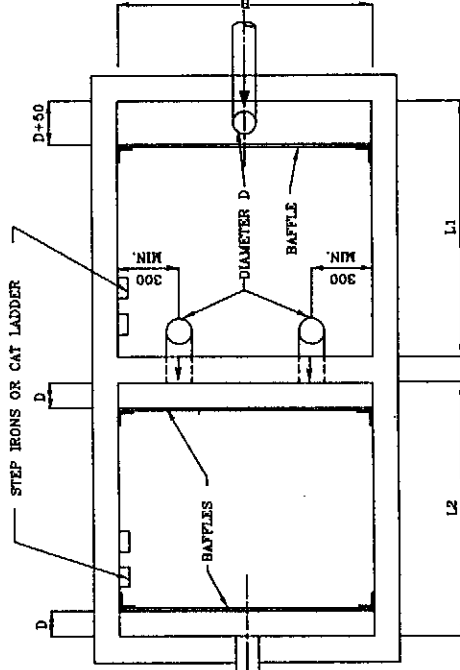
Drawing No. EP50/L1/1/01A
Scale: NTS

Group LIQUID WASTE PROJECTS

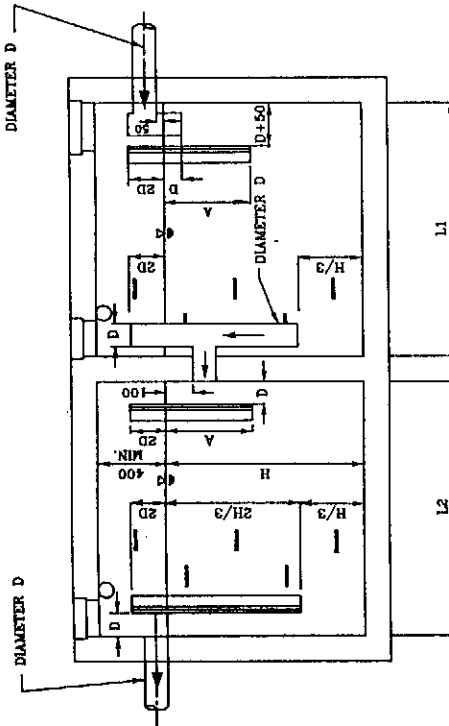
Environmental Protection Department Hong Kong



SECTION X-X



SECTIONAL PLAN



PLAN

CLEAR OPENING
550 X 550 MIN.
WITH COVER

Y
X

VENT PIPE
CLEANING HOLE
300 X 300 mm
WITH COVER

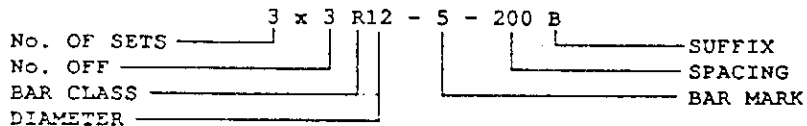
CLEANING HOLE
200 X 200 mm
WITH COVER

SAMPLING HOLE
200 X 200 mm
WITH COVER

TYPICAL DETAILS OF A GREASE TRAP

GENERAL NOTES :

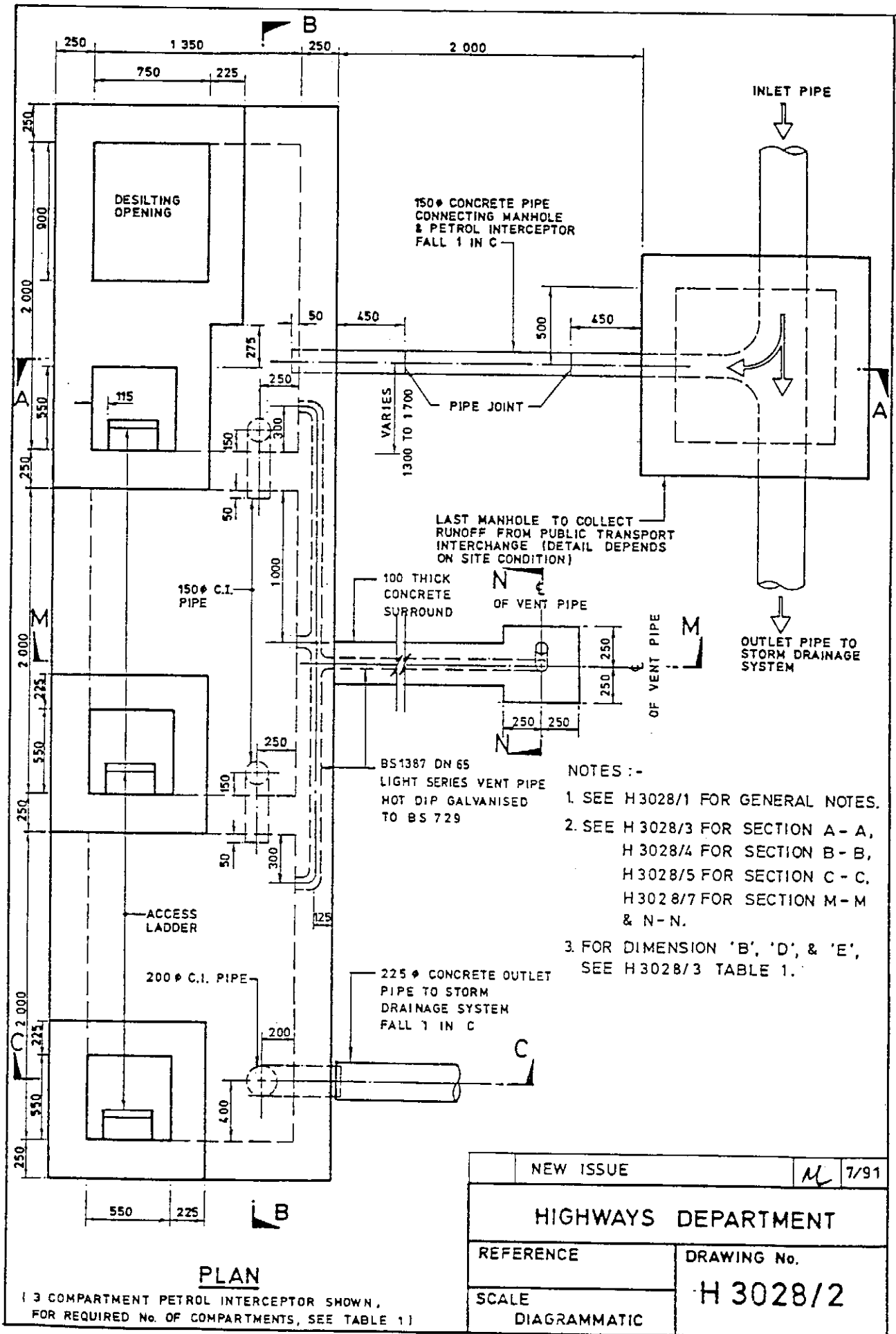
1. THE PETROL INTERCEPTOR IS DESIGNED TO PROVIDE AT LEAST 20 MINUTES RETENTION TO 5-10% OF THE MAXIMUM RUNOFF COLLECTED BY THE TRANSPORT INTERCHANGE IN A 1 IN 2 YEAR RAINSTORM.
2. DETAILS OF PETROL INTERCEPTOR SHOWN IN THESE DRAWING IS FOR OPEN SPACE PUBLIC TRANSPORT INTERCHANGE. FOR PETROL INTERCEPTOR AT COVERED PUBLIC TRANSPORT INTERCHANGE SEE CEO STANDARD DRAWING CE 1041.
3. ALL DIMENSIONS ARE IN MILLIMETRES.
4. CONCRETE TO BE GRADE 30/20.
5. REINFORCEMENT SHALL COMPLY TO BS 4449 AND SHALL BE BENT IN ACCORDANCE WITH BS 4466.
6. COVER TO REINFORCEMENT TO BE 50 mm UNLESS OTHERWISE SPECIFIED.
7. REINFORCEMENT NOTATION :



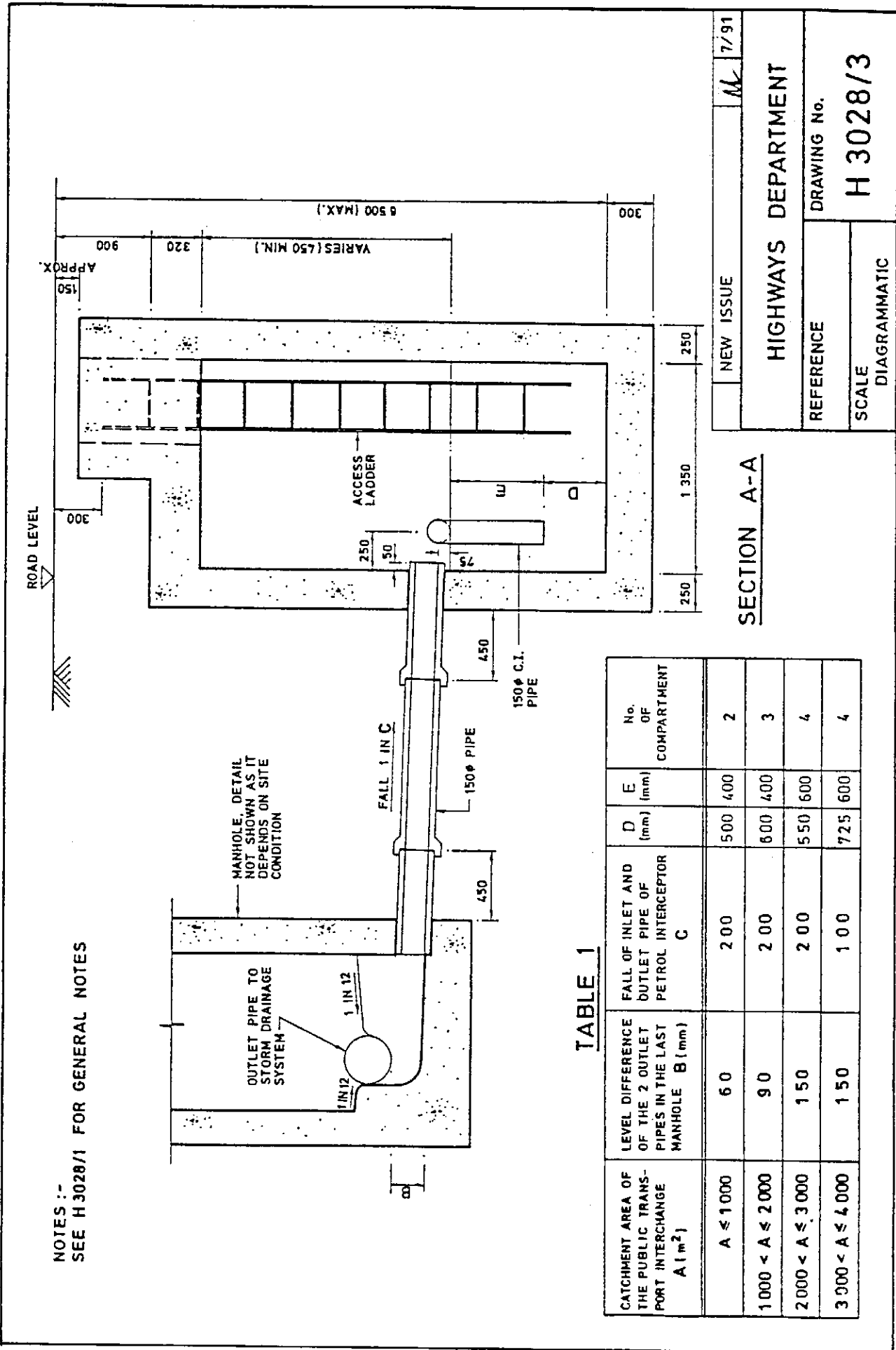
BAR CLASS - R= GRADE 250 PLAIN ROUND STEEL BAR
 SUFFIX --- T= TOP
 B= BOTTOM
 NF= NEAR FACE
 FF= FAR FACE
 EF= EACH FACE

8. MINIMUM LAP LENGTH : 40 DIAMETER OF BAR FOR MILD STEEL PLAIN BAR.
9. STRUCTURAL STEELWORK SHALL BE GRADE 43C COMPLY WITH BS 4360 UNLESS OTHERWISE SPECIFIED.
10. ALL FILLET WELDS TO BE 6 mm UNLESS OTHERWISE SPECIFIED.
11. STAINLESS STEEL ACCESS LADDER TO BE OF MINIMUM GRADE 304 S12 TO BS 970:PT1:1983.
12. FOR RSJ CONNECTIONS, SEE CEO STANDARD DRAWING CE 1020.
13. FOR DETAILS OF TOP TREATMENT TO PETROL INTERCEPTOR, SEE CEO STANDARD DRAWING CE 1021 FOR FLEXIBLE ROAD SURFACE AND HIGHWAY STANDARD DRAWING H 1006 FOR CONCRETE ROAD SLAB.
14. FOR DETAILS OF COVER TO PETROL INTERCEPTOR, SEE CEO STANDARD DRAWING CE 1022.
15. FOR DETAILS OF DESILTING OPENING COVER, SEE CEO STANDARD DRAWING CE 1023.

		NEW ISSUE		AL	7/91
PETROL INTERCEPTOR FOR OPEN PUBLIC TRANSPORT INTERCHANGE		HIGHWAYS DEPARTMENT			
		REFERENCE		DRAWING No.	
		SCALE		H 3028/1	



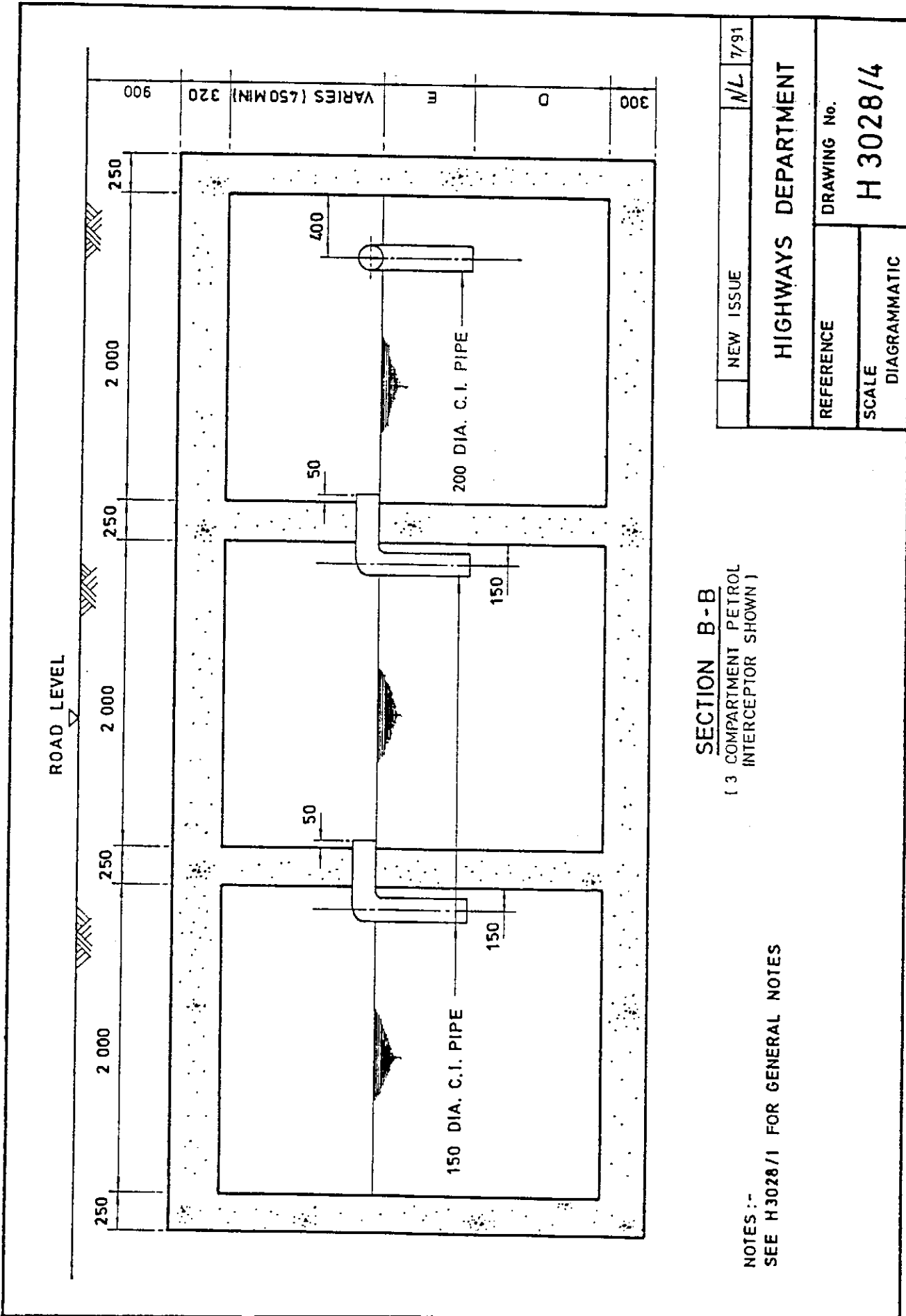
NEW ISSUE		M	7/91
HIGHWAYS DEPARTMENT			
REFERENCE	DRAWING No.		
SCALE	H 3028/2		
DIAGRAMMATIC			



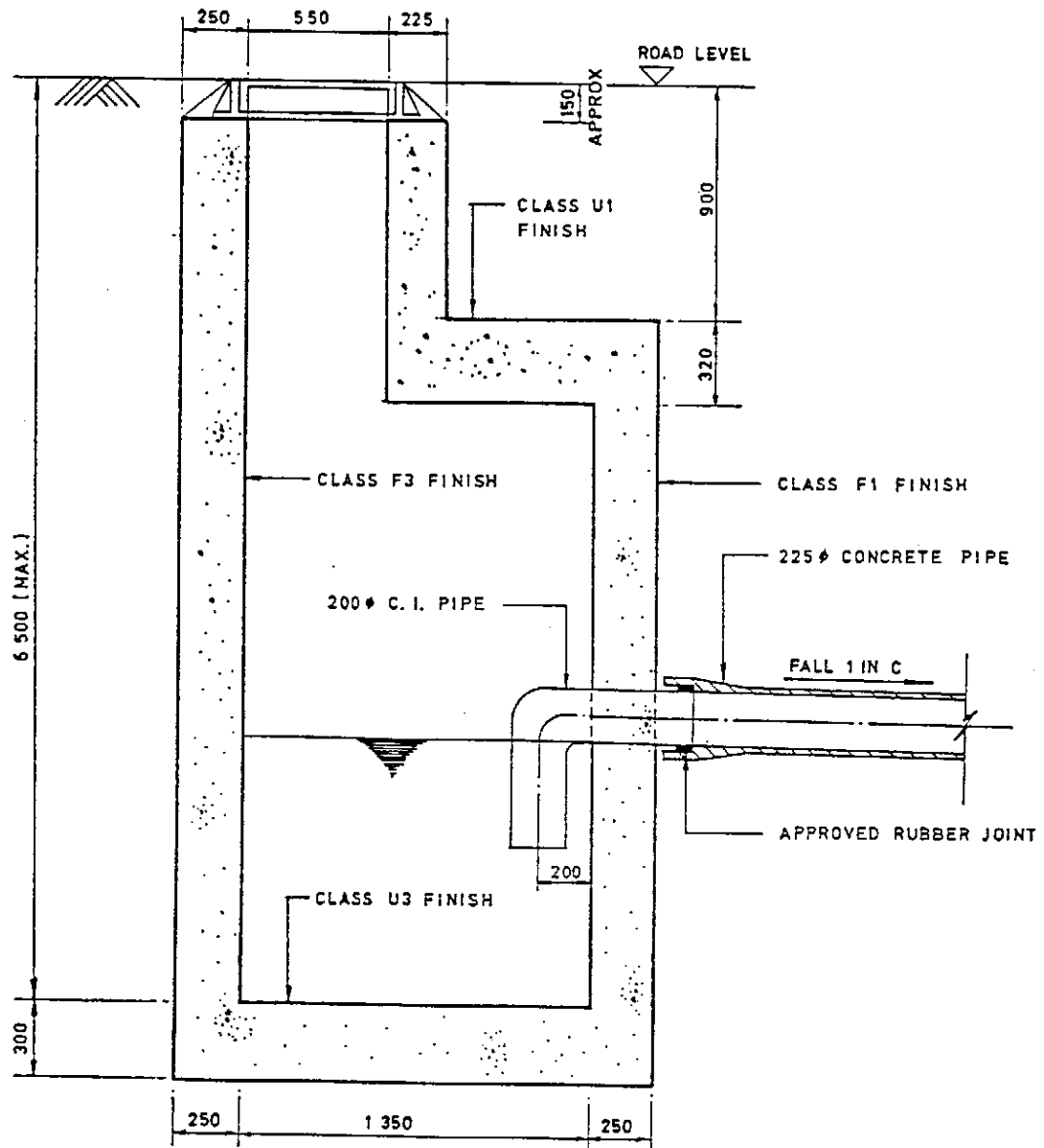
NOTES :-
SEE H 3028/1 FOR GENERAL NOTES

TABLE 1

CATCHMENT AREA OF THE PUBLIC TRANS-PORT INTERCHANGE A (m ²)	LEVEL DIFFERENCE OF THE 2 OUTLET PIPES IN THE LAST MANHOLE B (mm)	FALL OF INLET AND OUTLET PIPE OF PETROL INTERCEPTOR C	D (mm)	E (mm)	No. OF COMPARTMENT
A \leq 1 000	60	2 00	500	400	2
1 000 < A \leq 2 000	90	2 00	600	400	3
2 000 < A \leq 3 000	150	2 00	550	600	4
3 000 < A \leq 4 000	150	1 00	725	600	4

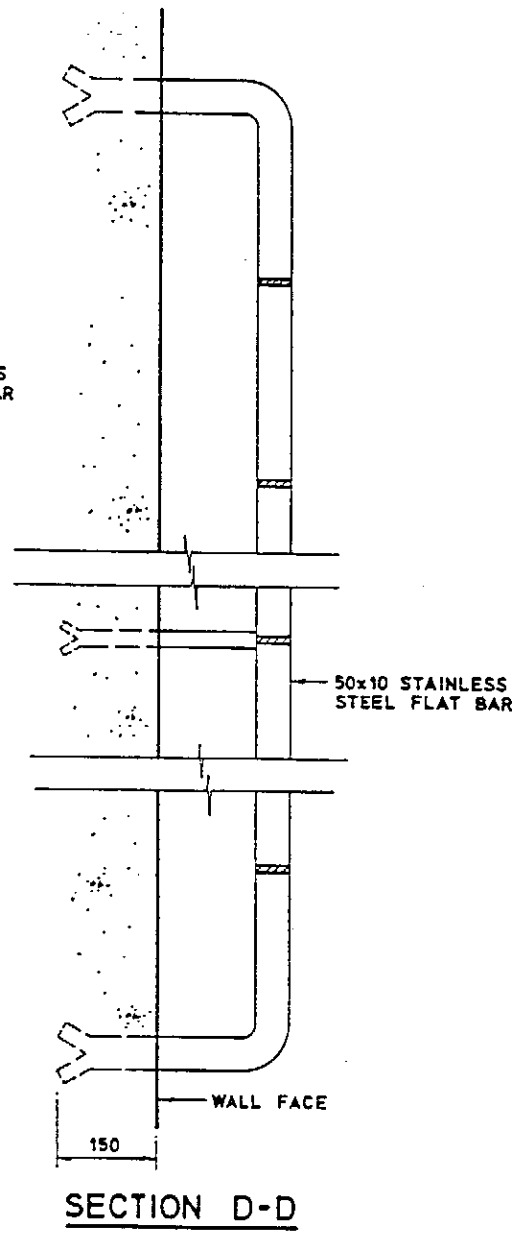
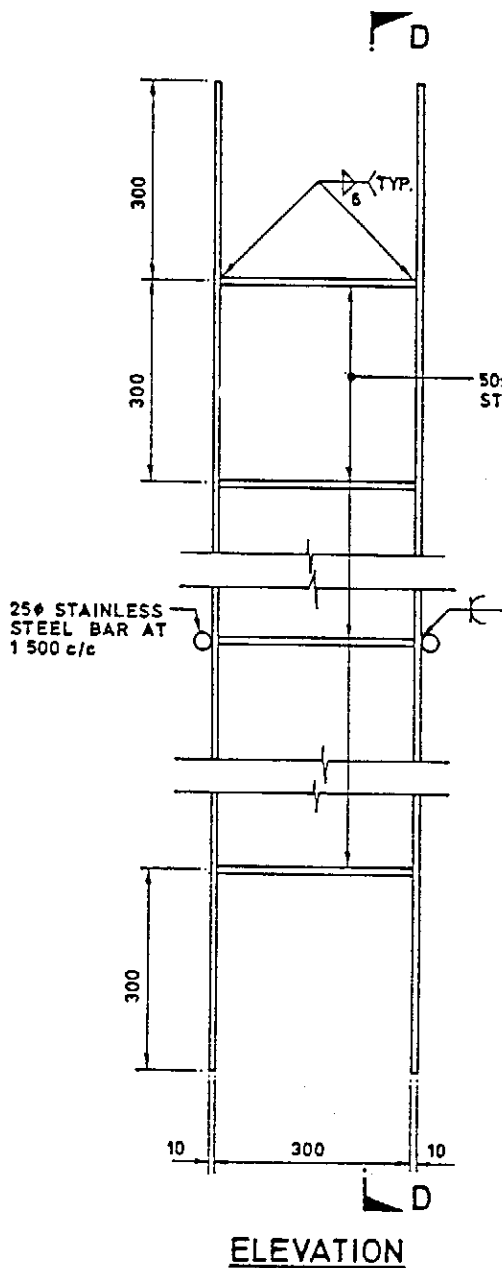


NOTES :-
SEE H 3028/1 FOR GENERAL NOTES

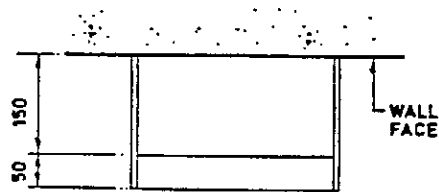


SECTION C-C

NEW ISSUE		NL	7/91
HIGHWAYS DEPARTMENT			
REFERENCE		DRAWING No.	
SCALE		H 3028/5	
1 : 25			

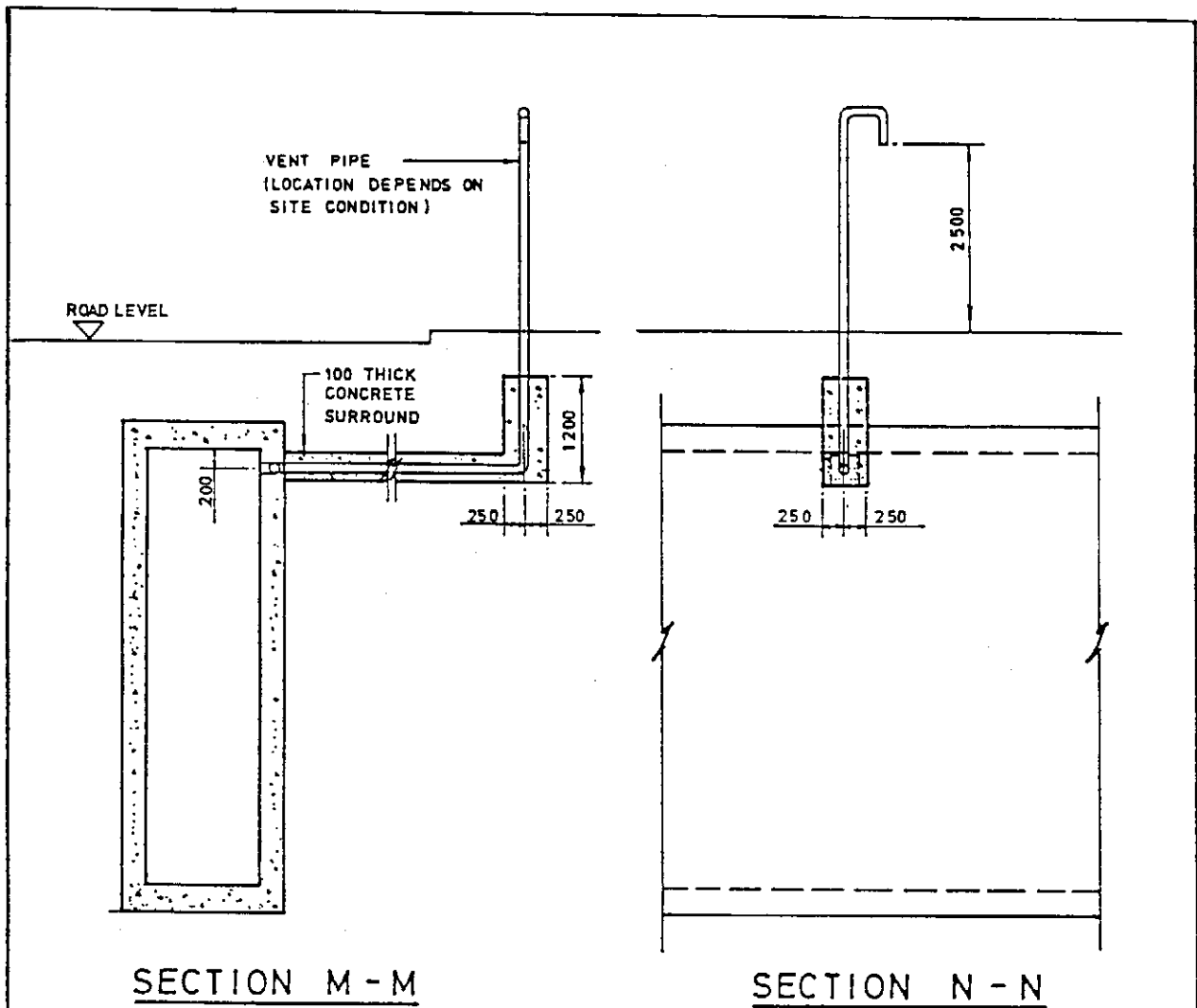


NOTES:-
SEE H 3028/1 FOR GENERAL NOTES



ACCESS LADDER

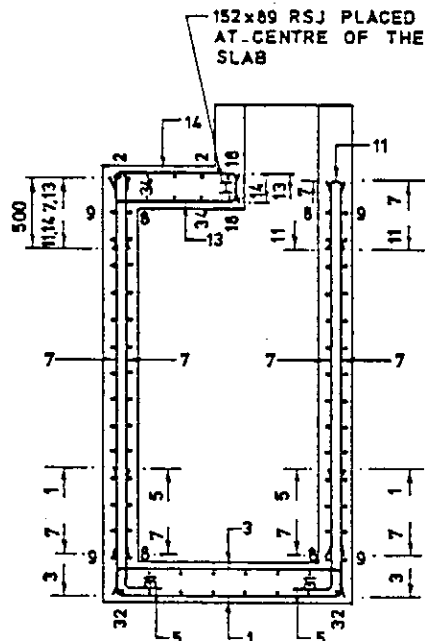
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HIGHWAYS DEPARTMENT			
REFERENCE		DRAWING No.	
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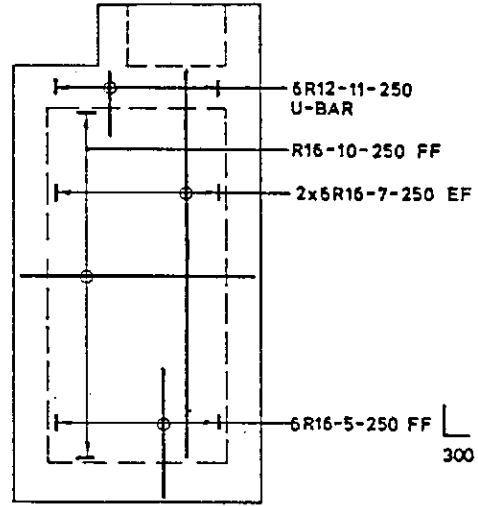
NOTES:-
SEE H3028/1 FOR GENERAL NOTES

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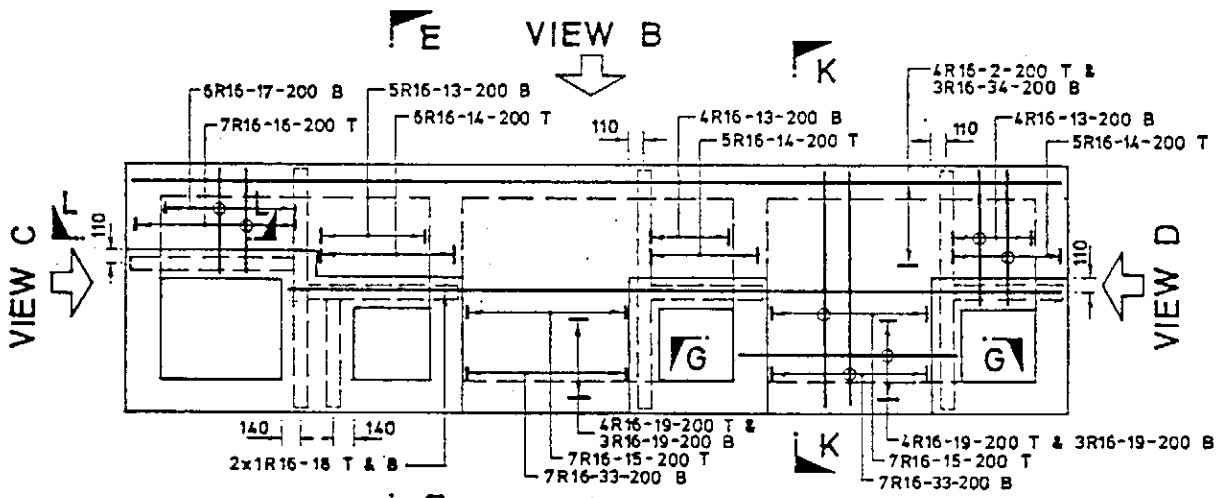
NOTES :-
SEE H 3028/1 FOR GENERAL NOTES



SECTION E-E

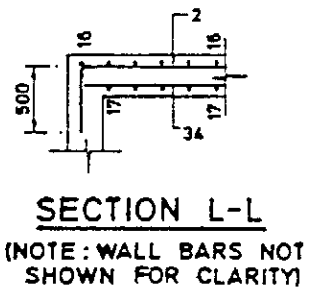


VIEW C
(VIEW D SIMILAR
BUT OPP. HANDED)



VIEW A
PLAN

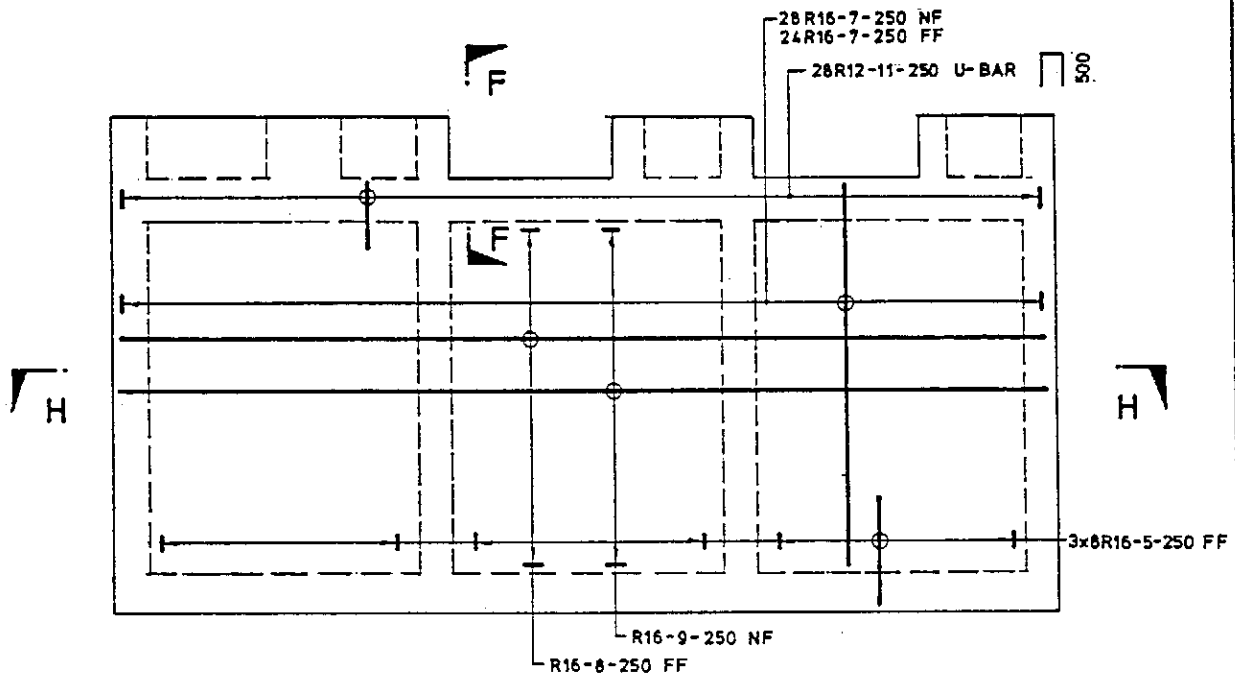
PETROL INTERCEPTOR
R.C. DETAIL



SECTION L-L
(NOTE: WALL BARS NOT
SHOWN FOR CLARITY)

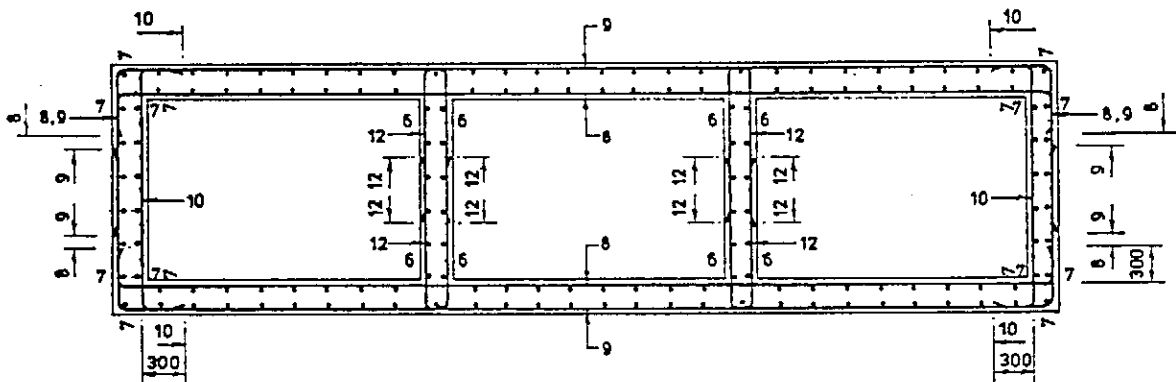
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HIGHWAYS DEPARTMENT			
REFERENCE	DRAWING No.		
SCALE	H 3028/ 8		
	1: 50		

NOTES :-
SEE H 3028/1 FOR GENERAL NOTES

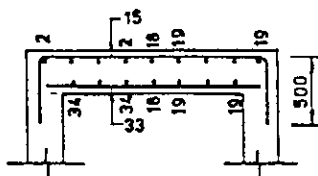


VIEW A

(VIEW B SIMILAR
BUT OPP. HANDED)



SECTION H-H

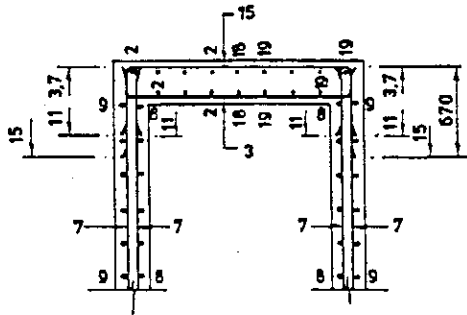


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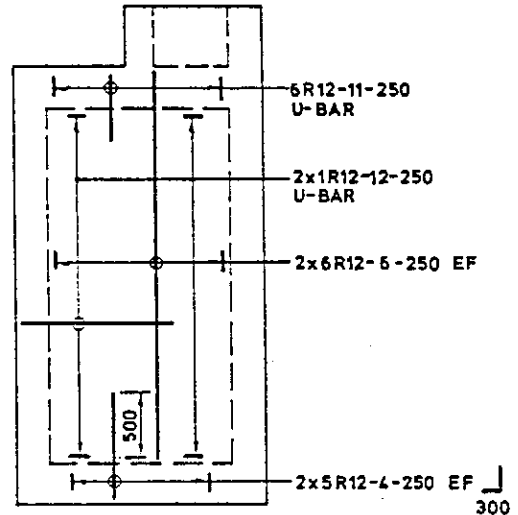
(NOTE: WALL BARS NOT
SHOWN FOR CLARITY)

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HIGHWAYS DEPARTMENT			
REFERENCE		DRAWING No.	
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1:50			

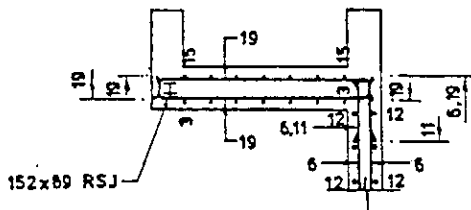
NOTES :-
SEE H3028/1 FOR GENERAL NOTES



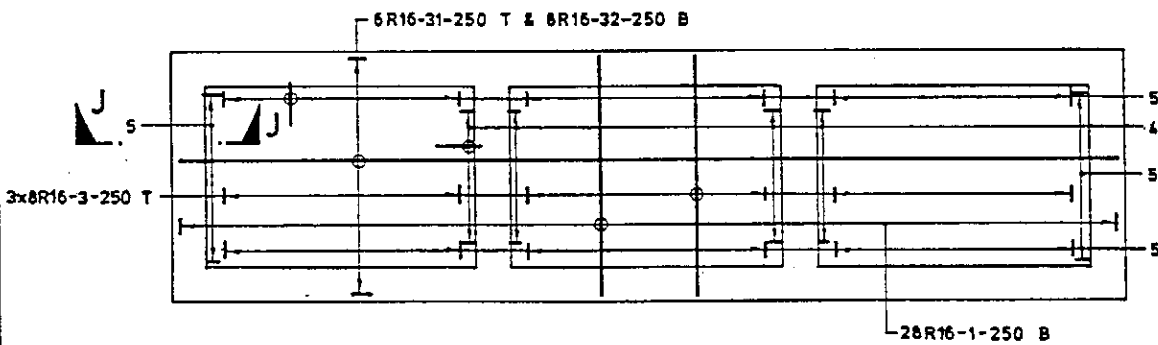
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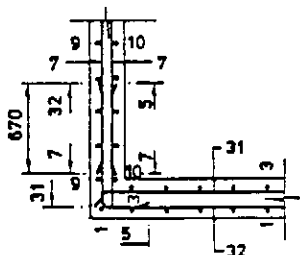
INTERNAL WALL



SECTION G-G

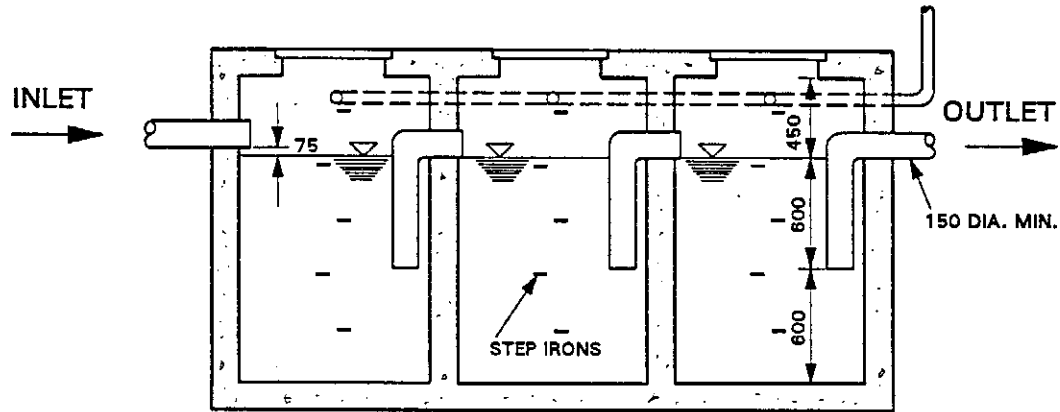


BASE SLAB

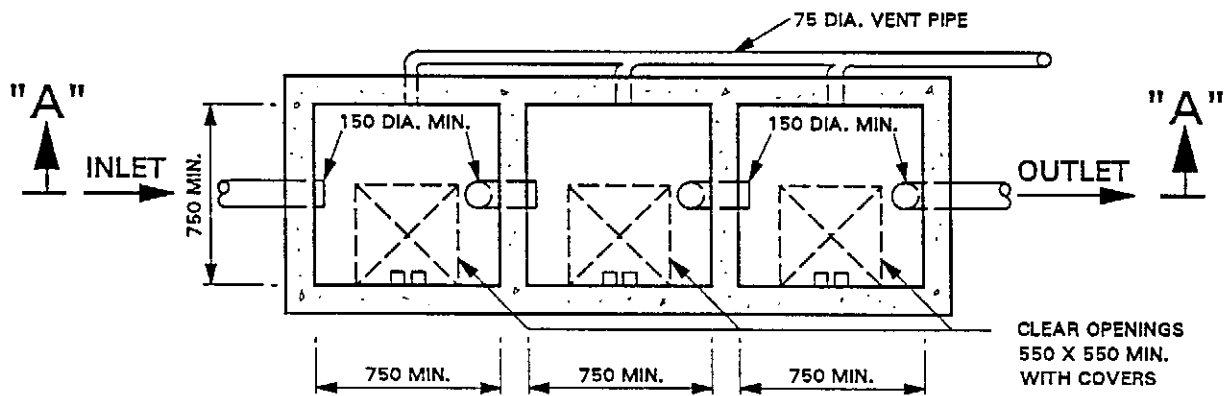


SECTION J-J

NEW ISSUE		N/L	7/91
HIGHWAYS DEPARTMENT			
REFERENCE		DRAWING No.	
SCALE		H 3028/10	
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SECTION A - A



PLAN

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRES

**TYPICAL DETAILS OF
A PETROL INTERCEPTOR**

drawing no.
EP 50/D1/1/01

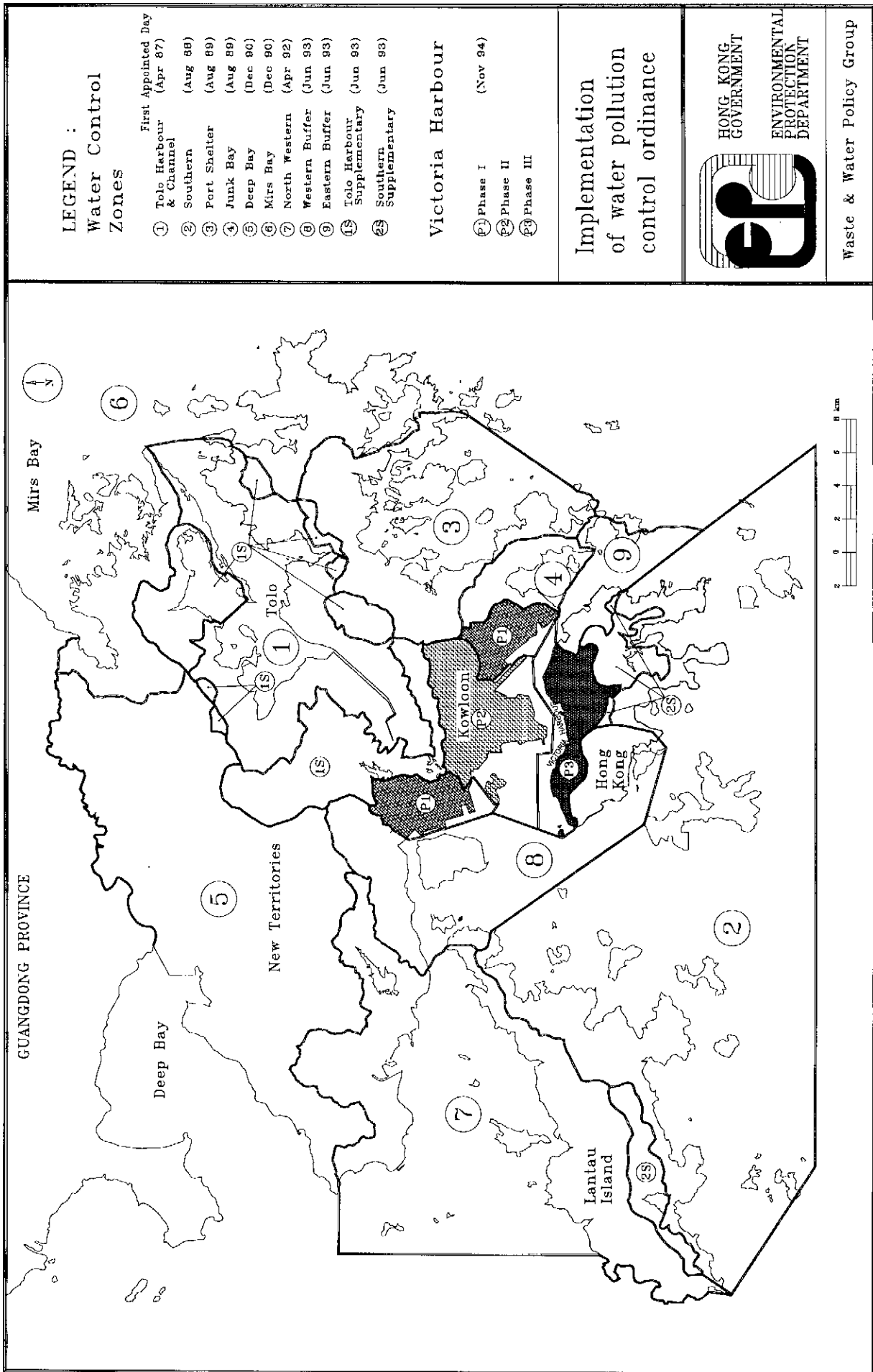
group
Liquid Waste Projects

date
5/93

scale
NTS

ENVIRONMENTAL
PROTECTION
DEPARTMENT
HONG KONG





Pollution from Industrial Buildings
Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulation 90

Buildings Ordinance sections 24 and 28 and Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulation 90 contain provisions which may be invoked by the Building Authority to tackle the problem of water pollution caused by the discharge of effluent from industrial buildings.

2. Following the issue of the first practice note on this subject in May 1987, more stringent measures have been taken in order to minimize the effects of untreated noxious effluent getting into drainage systems and causing pollution to water-courses and the sea. Such effluent can also seriously impair sewage treatment facilities or damage private or public drains and sewers. There is also the possibility of Government's drains and sewers being overloaded by industrial discharge or of workers being injured while repairing or maintaining drainage systems.

3. In addition to consulting the Environmental Protection Department in cases involving a single occupancy specialized industrial building where the industrial processes to be pursued are known and specific facilities can therefore be allowed for beforehand, the Building Authority will also pay particular attention to plans for 'flatted factory' development regarding general effluent treatment provisions.

4. It is therefore desirable for all authorized persons and registered structural engineers to seek from their clients information on the proposed industrial processes which the intended building occupants will pursue, and ensure that at drainage plan submission stage building uses are clearly stated and adequate provisions are made to treat any noxious effluent. Failure to provide this information may result in rejection of the drainage proposals under Buildings Ordinance section 16(1)(i).

5. In the case of 'flatted factory' development where multi-occupancy is to be expected, the assumption will be made that the industrial undertakings and places of work will normally discharge effluent of such volume or chemical composition as to call for the provision of drainage facilities other than those required under Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulation 5(1). Failure to make provision for future effluent discharge may lead to disapproval of the plans under Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulation 90.

6. For 'flatted factory' development, unless specific facilities are provided, each industrial unit should have an individual drainage outlet, adequately trapped, to receive treated trade effluent from that unit. This outlet must be connected to the foul water system and be of a size indicated below:

Factory usable floor area	Size of outlet
less than 1,000 m ²	100 mm diameter
more than 1,000 m ²	150 mm diameter minimum

The size of the vertical foul water down pipe will depend upon the number of floors served and should generally be within the range of 150 - 300 mm diameter. These outlets must not be connected to any storm-water drainage system. The outlets can be temporarily sealed at floor level until required by occupants of the unit for the purpose of discharging treated effluent, the assumption being that any effluent identified in Building (Standards of Sanitary Fitments, Plumbing, Drainage Works and Latrines) Regulation 90 will be treated by the occupants of the unit prior to being discharged into the outlet.

7. The need to provide a petrol interceptor in areas used for the servicing and parking of vehicles is well known. Standard details of the petrol interceptor are attached for general information. The preferred contemporary practice regarding other types of industrial effluent and appropriate methods of treatment is not so standardized or so clear. In case of doubt it may be necessary to obtain the advice of consultants.

8. In addition to tackling the pollution problem at plans submission stage, it is also worth mentioning that more attention will be focused on illegal, insanitary and polluting drains and sewers in future. To this end a unit has already been set up in the Buildings Ordinance Office with specific responsibility for seeking out and dealing with polluting factories. It is in the interest of all concerned that timely steps are taken to protect our environment.

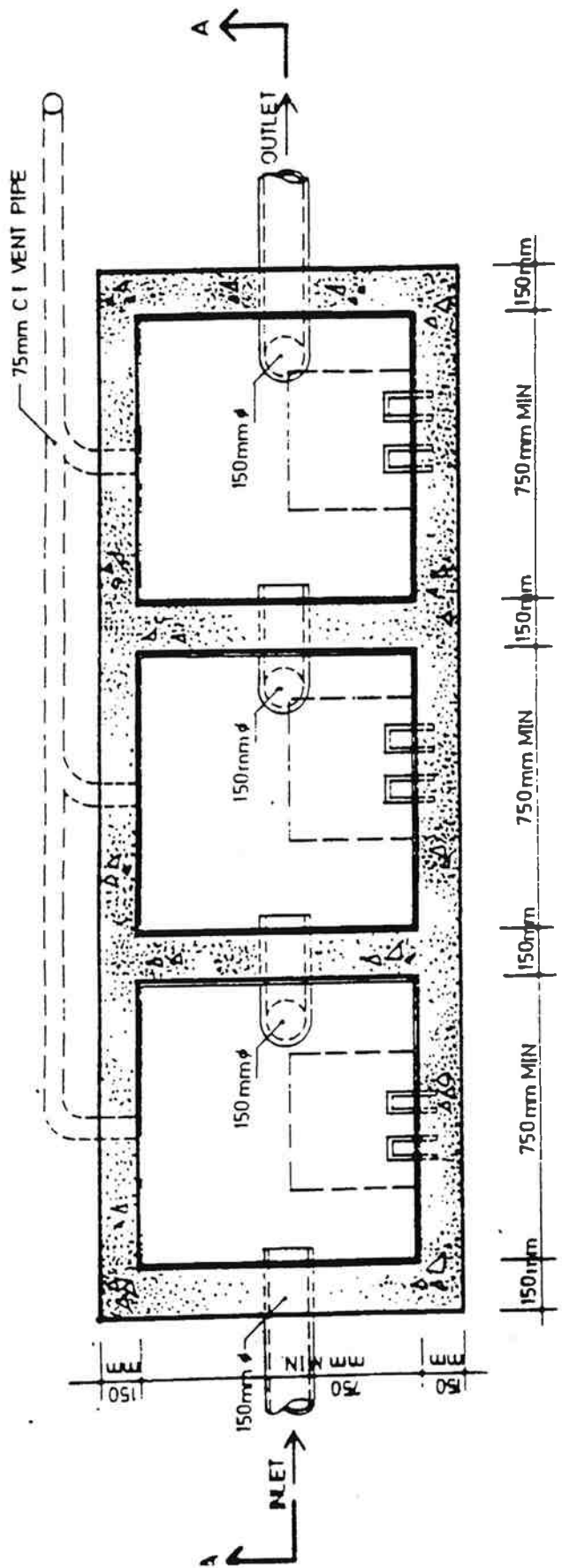
(A.W. Samson)
Building Authority

Ref: BLD(B) GR/BREG/SF/2

First issued May 1987

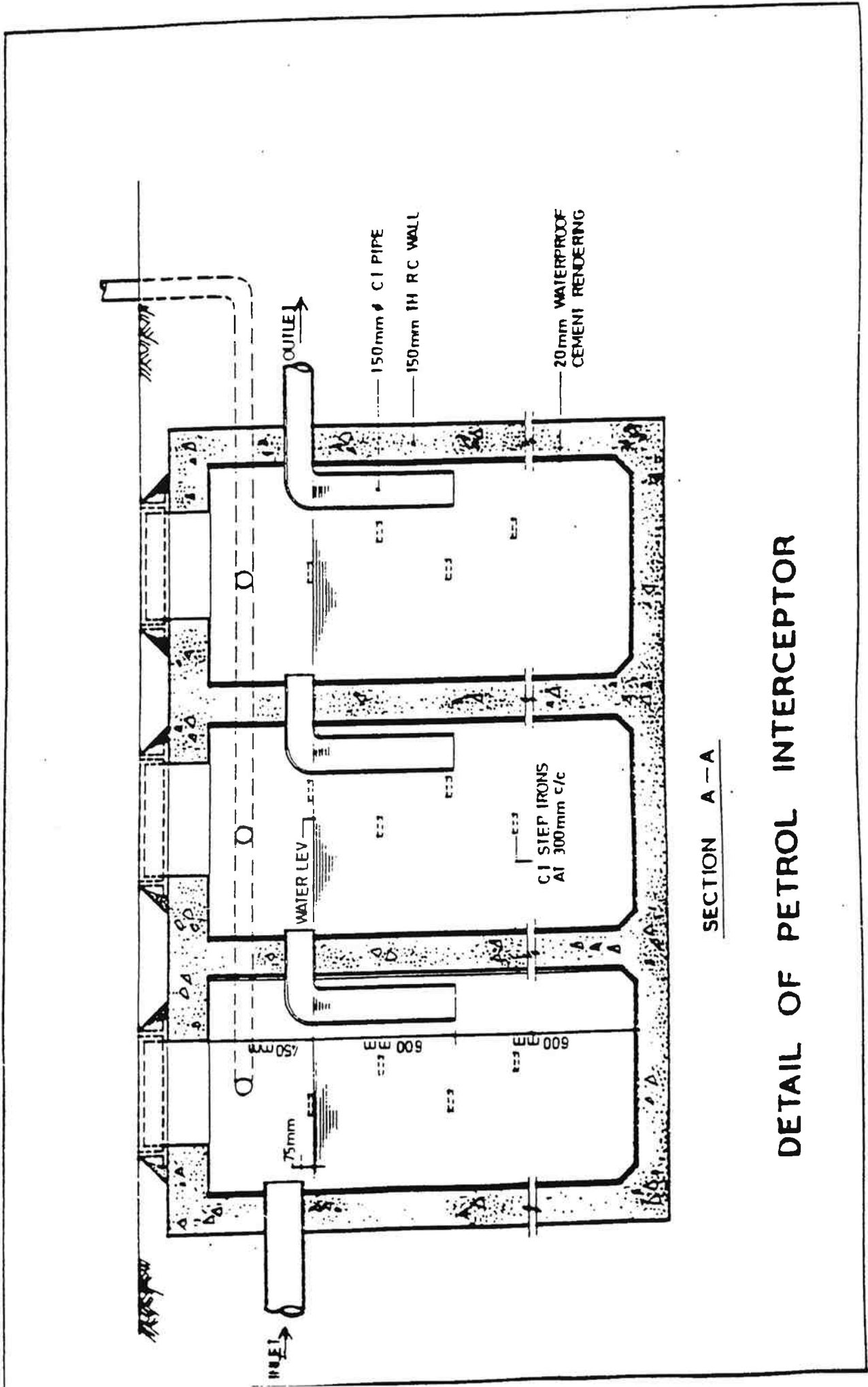
This update March 1992 (GBS/D) (para. 7 amended and grease trap details deleted)

Index under : B(SSFPDW&L)R 90 - Pollution from Industrial Buildings
Effluent - noxious
Pollution from Industrial Buildings



PLAN

DETAIL OF PETROL INTERCEPTOR



SECTION A-A

DETAIL OF PETROL INTERCEPTOR

Appendix 6C

**Estimation of Residual Fertilizer and
Washable Deposited Pesticides and
Volume of Storage Tanks**

Appendix 6C

Estimation of residual fertilizer and washable deposited pesticides and volume of storage tanks

1. Control
 - 1.1 The dosage of fertilizer and pesticides shall be controlled to limit the residual fertilizer and washable deposited pesticides to less than 10 % of the dosage.
 - 1.2 The water use is about 40.5 m³ for each watering during wet season.
2. Assumptions
 - 2.1 In each watering of 40.5 m³, the football pitch will take up more than 75% of the water due to evaporation and transpiration. Maximum 25% water will be collected through surface runoff or porous drain into the first water tank.
 - 2.2 The residual fertilizers and washable deposited pesticides will be rinsed for recycling after five cycles of irrigation or equivalent.
 - 2.3 5% surface runoff is seeped into ground.
3. Tank Volume Estimation
 - 3.1 Tank No. 1
 - 3.1.1 There will always be about 10 m³ of irrigation water in the tank, i.e.
 $25\% \text{ collected} \times 40.5 \text{ m}^3 = 10 \text{ m}^3$
 - 3.1.2 Capacity for five cycles of irrigation water

$5 \times 40.5 \text{ m}^3$	=	202.5 m ³
Total volume		212.5 m ³
Say		250.0 m ³
 - 3.2 Tank No. 2
 - 3.2.1 Since it is a fail-safe standby tank, volume same as Tank No. 1, 250 m³.
 - 3.3 Total capacity to cater for Black Rainstorm Warning (70 mm for 1 hour).
Total capacity = 95% x 0.07 m x 11,000 m² + 10 m³ = 741.5 m³.
 - 3.4 Tank No. 3
Volume of Tank No. 3
= Total storage capacity – Tank No. 1 – Tank No. 2
= 741.5 m³ – 250 m³ – 250 m³
= 241.5 m³, say 250 m³
4. Dosage estimation
 - 4.1 Residual fertilizer and washable pesticide 10%
 - 4.2 95% collected in intercepting system
5% seepage into ground
 - 4.3 Seepage into ground : 5% x 10% = 0.5%, negligible
 - 4.4 Due to geological formation and presence of underground structures, this 0.5% seepage will not reach Victoria Harbour or Kai Tak Nullah.

Appendix 6D

**Content of Stormwater Re-use
Management Plan**

Appendix 6D

Content of Stormwater Re-use Management Plan

1. Introduction
 - 1.1 Background
 - 1.2 Objectives
 - 1.3 Scope
2. Application of Fertilizer
 - 2.1 Selection of fertilizer
 - 2.2 Storage and control
 - 2.3 Application, including dosages, frequency, residual quantities
 - 2.4 Control and monitoring of application
3. Application of Pesticides
 - 3.1 Selection of pesticides
 - 3.2 Storage and control
 - 3.3 Application, including dosages, frequency, residual quantities
 - 3.4 Control and monitoring of application
4. The Stormwater Re-use System
 - 4.1 System flow diagram including points of control
 - 4.2 Physical system, including storage tanks, intercepting facilities, etc.
5. Operation and Maintenance
6. Monitoring and Control
 - 6.1 Criteria of monitoring and control, including parameters, sampling and testing
 - 6.2 Frequency and locations of sampling and testing
 - 6.3 Action and Limit levels
7. Mitigation and emergency actions
8. Reporting

Appendix 7.1

**Number of Temporary Staff Working in
H.K. Stadium during H.K. Sevens 2014**

MAURICE LEE & ASSOCIATES LTD.	Project	Consultancy Services to carry out Environmental Impact Assessment and Traffic Impact Assessment Studies for the Multi-purpose Sports Complex at Kai Tak Area				Project No.:	HA921	
	Title	Number of temporary staff working in Hong Kong Stadium during Hong Kong Sevens 2014						
李榮護建築工程師事務所 有限公司	Prepared	MicL	Chkd	ML	Date	24-Oct-14	Page	1
	Revised	MicL	Chkd	ML	Date	17-Feb-15	Rev.()	1st Issue

The table below shows the number of temporary staff involved in Hong Kong Sevens 2014, according to the Statistics of Hong Kong Sevens 2014 from LCSD.

No. of temporary staff working in HK Stadium during HK Sevens 2014			
Category	3/28/2014	3/29/2014	3/30/2014
Security Guard	510	610	610
Senior Stadium Assistant / Stadium Assistant	180	185	185
Cleansing	240	380	380
Members of St. John	90	160	195
EMSD & other technical Staff	25	26	26
Catering staff	2,500	2,700	2,600
Total	3,545	4,061	3,996

Appendix 7.2

**Extract from Infrastructure Review Report
(Table 4.17 and 4.18) &
Flow Comparison and Back Analysis**

Table 4.17 – Peaking Factors for KTIPS, KTPTW and TKWPTW

Facilities	Peaking Factors		Peaking Factors (Kwun Tong Catchment / To Kwa Wan Catchment+ 10% Allowance (m ³ /day))	
	Year 2031	Ultimate	Year 2031	Ultimate
KTIPS	2.49	2.48	2.47	2.47
KTPTW	2.43	2.43	2.42	2.41
TKWPTW	2.50	2.49	2.48	2.48

Note: (1) Peaking factors (PF) are calculated from EPD's guideline for population > 50,000:
 $\text{Max}(3.9/N^{0.065}, 2.4)$,
 where N is the contributing population in thousands
 Contributing population = Calculated total average flow / 0.27

Table 4.18 – Projected Peak Flows for Year 2031 and Ultimate Scenarios

Facilities	Projected PWWF (m ³ /s)		Projected PWWF (m ³ /s) (Kwun Tong Catchment / To Kwa Wan Catchment+ 10% Allowance (m ³ /day))	
	Year 2031	Ultimate	Year 2031	Ultimate
Kwun Tong Intermediate Pumping Station				
Kai Tak Development	1.20	1.20	1.20	1.19
Kwun Tong Catchments	6.68	6.99	7.30	7.65
Cruise Passenger at Terminal Buildings ⁽¹⁾	0.00	0.00	0.00	0.00
Cruise Vessel Discharge ⁽²⁾	0.10	0.10	0.10	0.10
DWFI from JVBC			0.50	0.50
TOTAL	8.48	8.79	9.11	9.45
Kwun Tong Preliminary Treatment Works				
Kai Tak Development	1.18	1.17	1.17	1.17
Kwun Tong Catchments	9.54	9.99	10.44	10.93

Facilities	Projected PWWF (m ³ /s)		Projected PWWF (m ³ /s) (Kwun Tong Catchment / To Kwa Wan Catchment+ 10% Allowance (m ³ /day))	
	Year 2031	Ultimate	Year 2031	Ultimate
Cruise Passenger at Terminal Buildings ⁽¹⁾	0.00	0.00	0.00	0.00
Cruise Vessel Discharge ⁽²⁾	0.10	0.10	0.10	0.10
DWFI from JVBC			0.50	0.50
TOTAL	11.32	11.77	12.21	12.70
To Kwa Wan Preliminary Treatment Works				
Kai Tak Development	0.79	0.79	0.79	0.79
To Kwa Wan Catchments	6.58	6.90	7.19	7.53
MPSC Stadium	0.083	0.083	0.083	0.083
MTR – SCL	0.018	0.018	0.018	0.018
DWFI (NPS)	0.214	0.214	0.214	0.214
TOTAL	7.69	8.01	8.30	8.63

Notes: (1) Sewage flows generated from cruise passengers at terminal buildings are assumed to be 30% flow of Cruise Terminal Buildings for one berthing.
 (2) Cruise vessels discharge to the Kai Tak sewerage system is assumed to be pumped in a period of 8 hours ($Q_{\text{vessel}} \text{ (m}^3\text{/s)} = 2941/60/60/8$)
 (3) Projected peak flows are rounded to 2 decimal places.

Appendix 7.2 (ii)

Flow Comparison and back analysis

Extract from KTD Infrastructural Review Report (Final) Rev 1 (August 2014)

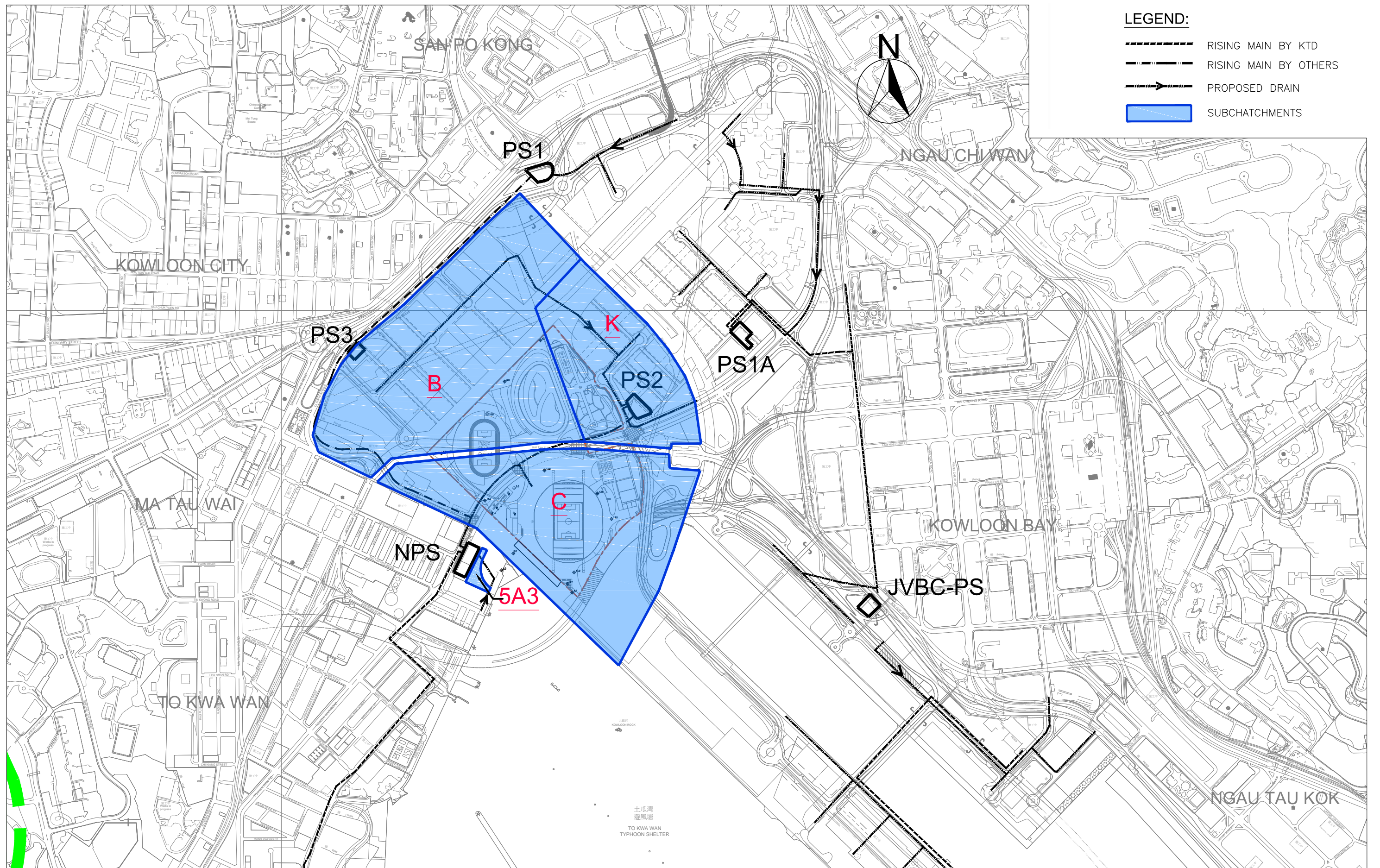
		Dry weather flow (DWF)				Peaking Factor and Peak Flow				Remark
		Year 2031	Ultimate	Year 2031	Ultimate	Year 2031	Ultimate	Year 2031	Ultimate	
Factor	KTIPS	1	1	1	1	2.49	2.48	2.47	2.47	Kwun Tong Intermediate Pumping Station (KTIPS)
	KTPTW	1	1	1	1	2.43	2.43	2.42	2.41	Kwun Tong Preliminary Treatment Works KTPTW)
	TKWPTW	1	1	1	1	2.5	2.49	2.48	2.48	To Kwa Wan Preliminary Treatment Works (TKWPTW)
Flow in m3/day	KTIPS	276,730	288,326	299,923	312,678	689057.7	715048.48	740809.81	772314.66	Estimated Peak flow allowing 10% increase
	KTPTW	383,412	400,342	417,273	435,895	931691.16	972831.06	1009800.7	1050507	
	TKWPTW	254,852	266,221	277,589	290,095	637130	662890.29	688420.72	719435.6	
Flow in m3/sec	KTIPS					8.48	8.79	9.11	9.45	Peak flow from IRR Table 4.18
	KTPTW					11.32	11.77	12.21	12.7	
	TKWPTW					7.69	8.01	8.3	8.63	
Flow in m3/sec	KTIPS					8.77	9.10	9.43	9.83	Estimated Peak flow allowing 10% increase
	KTPTW					11.86	12.39	12.86	13.37	The values do not match those in IRR Table 4.18
	TKWPTW					8.11	8.44	8.76	9.16	

Breakdown of flow in TKWPTW

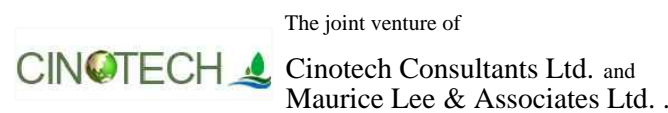
	Back calculated DWF in m3/sec				From IRR Table 4.18, Peak WWF in m3/sec				Remark
	Year 2031	Ultimate	Year 2031	Ultimate	Year 2031	Ultimate	Year 2031	Ultimate	
Kai Tak Development	0.316	0.317269	0.318548	0.318548	0.79	0.79	0.79	0.79	
To Kwa Wan Catchments	2.632	2.771084	2.899194	3.03629	6.58	6.9	7.19	7.53	
MPSC Stadium	0.0332	0.033333	0.033468	0.033468	0.083	0.083	0.083	0.083	Average DWF
MTR – SCL	0.0072	0.007229	0.007258	0.007258	0.018	0.018	0.018	0.018	
DWFI (NPS)	0.0856	0.085944	0.08629	0.08629	0.214	0.214	0.214	0.214	
Total	3.074	3.214859	3.344758	3.481855	7.685	8.005	8.295	8.635	

Appendix 7.3

**Sewer Sub-Catchments of Pumping Station
NPS and PS2 & Preliminary Sewerage
Calculation**



Appendix 7.3 (i) : SEWER SUB-CATCHMENTS OF PUMPING STATION OF NPS AND PS2



The joint venture of
Cinotech Consultants Ltd. and Maurice Lee & Associates Ltd.



Sub-Consultant
MVA
 SYSTRA GROUP

Drafting by	RW	01/16
Designed by	ML	01/16
Checked by	ML	01/16
Approved by	ML	01/16

SCALE: N.T.S @ A3 SIZE

PROJECT: Kai Tak Multi-purpose Sports Complex

DRAWING NO:
 Appendix 7.3(i)

REV:
 -

A sewer on the north of Kai Tak Tunnel collecting sewage from from FDP1 to FDP4 successively for Public Sports Ground and Indoor Sports Centre then joining a 750mm twin pipe leading to Pumping Station PS2 at the junction of Road L6 and Road D2, hereinafter called Sewer No. 1.

Use	Types of Population	Estimated Population	Unit Flow Factor (m ³ /person/day)	Estimated Flow (m ³ /day)
Public Sports Ground	Spectator	7,000	0.032	224
	Permanent	40	0.28	11.2
	Temporary	350	0.064	22.4
TOTAL (m³/day)				257.60
Through Foul Water Discharge Point FDP1 (m ³ /day)				50.0
Through Foul Water Discharge Point FDP2 (m ³ /day)				207.6

Indoor Sports Centre	Spectator	5,400	0.032	172.8
	Permanent	55	0.28	15.4
	Temporary	55	0.064	3.52
TOTAL (m³/day)				191.72
through Foul Water Discharge Point FDP3 (m ³ /day)				191.72

A 600mm sewer collecting sewage from the Main Stadium discharges into a 750mm diameter sewer subsequently discharges into Pumping Station NPS

Main Stadium	Spectator	50,000	0.032	1,600.00
	Permanent	30	0.28	8.40
	Temporary	5,125	0.064	328.00
Retail Area	Employee	2,280	0.28	638.40
	Visitor	2,105	0.016	33.68
TOTAL (m³/day)				2,608.48
Through Foul Water Discharge Point FDP4 (m ³ /day)				80.00
Through Foul Water Discharge Point FDP5 (m ³ /day)				1,856.40

A 300mm sewer collecting sewage from Hotel Block and Office Block, discharges into a 750mm diameter sewer subsequently discharges into Pumping Station NPS

Hotel Area	Resident	480	0.37	177.60
	Employee	300	1.58	474.00
Office Area	Employee	800	0.28	224.00
TOTAL (m³/day)				875.60
through Foul Water Discharge Point FDP6 (m ³ /day)				875.60

MAURICE LEE & ASSOCIATES LTD.	Project:	Consultancy Services to carry out Environmental Impact Assessment and Traffic Impact Assessment Studies for the Multi-purpose Sports Complex at Kai Tak Area			Project No.:	HA921
	Title:	Draft Sewage Capacity Check for Pumping Station PS2				
李榮護建築工程師事務所 有限公司	Prepared	MicL	Chkd	ML	Date	18-Feb-15
	Revised				Date	
			Chkd		Page	
					Rev.()	Draft

Estimation of Sewage Flow in MPSC for (3) Further Updating

Sewage Capacity Check for Pumping Station PS2

Worst Case Scenario for PS2

The maximum population in the MPSC for this case would be 7,000 seats (public sports ground) + 5,400 seats (indoor sports Centre) + employees for public sports ground and indoor sports arena.

Therefore, the ADWF in the MPSC for this case would be the sum of ADWF of Spectators, permanent and temporary employees in Public Sports Ground and Indoor Sports Centre.

Estimated Peak Flow of Pumping Station PS2

	Items	Unit	Estimated Peak Flow	Remarks
a.	ADWF of Catchment B	m ³ /day	11,681	(Extracted from Infrastructure Review Report (IRR) of KTD Engineering Study CE35/2006(CE)) Table 4.22
b.	ADWF of Catchment K	m ³ /day	3,713	
c.	Peaking Factor	-	2	
d.	Peak Flow of Upstream Catchment	L/s	356.34	
e.	ADWF of MPSC	m ³ /day	449.32	-
k.	Contributing population for ADWF of MPS	-	1,664	Contributing population = Calculated total average flow (m ³ /day) / 0.27 (m ³ /person/day) from clause 12.1 of EPD's GESF (2005))
f.	Peaking Factor adopted for MPSC (Including Stormwater Allowance)	-	4.0	Based on contributing population (Extracted from Table T-5 of EPD's GESF (2005))(b) Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations
g.	Peak Flow of MPSC	L/s	20.8	(e x f x 1,000 / 24 / 60 / 60)
h.	MTR SCL	L/s	18	(Extracted from IRR of KTD Engineering Study CE35/2006(CE))
i.	Estimated Peak Flow of PS2	L/s	395	(Sum of peak flow of item d, g and h)
j.	Design Flow of PS2	L/s	501	(Extracted from IRR of KTD Engineering Study CE35/2006(CE))

Remarks:

Peaking factor of 4 (with stormwater allowance) is adopted for MPSC in the assessment of PS2 where the Contributing population range in the MPSC in this case is less than 10000.

MAURICE LEE & ASSOCIATES LTD. 李榮護建築工程師事務所 有限公司	Project:	Consultancy Services to carry out Environmental Impact Assessment and Traffic Impact Assessment Studies for the Multi-purpose Sports Complex at Kai Tak Area			Project No.:	HA921
	Title:	Draft Sewage Capacity Check for Pumping Station NPS				
	Prepared:	MicL	Chkd:	ML	Date:	18-Feb-15
	Revised:				Date:	
			Chkd		Page	
					Rev.()	Draft

Estimation of Sewage Flow in MPSC for (3) Further Updating

Sewage Capacity Check for Pumping Station NPS

All the sewage generated from MPSC will be discharged into NPS.

Worst Case Scenario for NPS

The maximum population in the MPSC for this case would be 7,000 seats (public sports ground)+50,000 seats (main stadium) + 5,400 seats (indoor sports Centre) + employees for public sports ground, main stadium and indoor sports arena + hotels/retail/office area.

Therefore, the ADWF in the MPSC for this case would be the sum of ADWF of Spectators in public sports ground, Main Stadium and Indoor Sports Centre, permanent and temporary employees in the public sports ground, Main Stadium and Indoor Sports Centre, residents and employees in Hotel Area, employees and visitors in Retail Area and employees in Office Area.

The Location of Catchments B,K,C and 5A3 is shown in Appendix 7.3 (i).

Estimated Peak Flow of Pumping Station NPS

Items	Unit	Estimated Peak Flow	Remarks	
a.	ADWF of Catchment B	m ³ /day	11,681	(Extracted from Infrastructure Review Report (IRR) of KTD Engineering Study CE35/2006(CE)) Table 4.23
b.	ADWF of Catchment K	m ³ /day	3,713	
c.	ADWF of Catchment C (including CKR's administration building)	m ³ /day	28	
d.	ADWF of Catchment 5A3	m ³ /day	31	
e.	Peaking Factor	-	2.0	
f.	Peak Flow of Upstream Catchment	L/s	358	
g.	ADWF of MPSC	m ³ /day	3,933	
n.	Contributing population for MPSC	-	14,568	Contributing population =Calculated total average flow (m3/day)/ 0.27(m3/person/day) from clause 12.1 of EPD's GESF (2005))
h.	Peaking Factor adopted for MPSC (Including Stormwater Allowance)	-	3.5	(Extracted from Table T-5 of EPD's GESF (2005))(b) Sewage Treatment Works, Preliminary Treatment Works and Pumping Stations
i.	Peak Flow of MPSC	L/s	159	(g x h x 1,000 / 24 / 60 / 60)
j.	MTR SCL	L/s	18	(Extracted from Infrastructure Review Report (IRR) of KTD
k.	DWFI	L/s	214	Engineering Study CE35/2006(CE))
l.	Estimated Peak Flow of NPS	L/s	749	(Sum of peak flow of item f, i, j and k)
m.	Design Flow of NPS	L/s	805	(Extracted from IRR of KTD Engineering Study CE35/2006(CE))

Remarks:

Peaking factor of 3.5 (with stormwater allowance) is adopted for MPSC in the assessment of PS2 where the Contributing population range in the MPSC in this case is 10,000 – 25,000 and the upstream sewers are known and newly laid.

HA921 Check the impact of new sewerage system from MPSC to the pipe leading to Pumping Station**(I) Design Synopsis**

The MPSC sewers impact assessment is based on the CEDD KAI TAK DEVELOPMENT - Stage 4 infrastructure at former north apron area Sewerage design Contract No. KL/2012/03 and Stage 5A infrastructure at former north apron area

- (1) Roughness coefficients (Ks) to be adopted by CEDD design for different pipes and conditions are as follows:
Ks = 0.6mm for vitrified clay pipes; Ks = 1.5mm for precast concrete pipes.
(Refer to Appendix 7.4)
- (2) Siltation, gradient of pipes and appropriate pipe roughness are referred to Appendix 7.3 page 10 to page 21 working drawings by CEDD under CEDD confirms that Siltation is not considered during design of the sewers since pipelines are newly laid and clean.
(Refer to Appendix 7.4)
- (3) The peaking factor (Including Stormwater Allowance) for checking sewer capacity is referred to Part (a) of Table T-5 under GESF.
- (4) According to Sewerage Manual by Drainage Services Department
Minimum velocity to achieve self-cleansing conditions= 1 m/s, for sewers of diameter up to 900mm
Maximum velocity at peak flow shall be limited to 3 m/s
- (5) CEDD confirms that the infrastructure provisions by CEDD are able to cater for the updated sewage estimation of MPSC.
(Refer to Appendix 7.4)

(II) MPSC Sewer To PS2

A sewer on the north of Kai Tak Tunnel collecting sewage from from FDP1 to FDP4 successively for Public Sports Ground and Indoor Sports Centre then joining a 750mm twin pipe leading to Pumping Station PS2 at the junction of Road L6 and Road D2, hereinafter called Sewer No. 1.
(Drawings referred to Appendix 7.3 page 10 to 20 and Manhole & Pipe Schedule referred to Page 13 and 15)

(1) The 300mm sewer pipe collecting sewage from Public Sports Ground through Foulwater Discharge Point FDP 1 (Drawing referred to page 10 and Manhole&Pipe details referred to Page 13 and 21)

Pipe Size (DN)	Up Stream Manhole	Down Stream Manhole	Estimated ADWF from Public Sports Ground		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow (l/sec)	Pipe Material	Pipe Roughness Ks mm	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
300	FMH10_71a	FMH10_71	50	0.58	185	8	4.63	precast concrete pipe	1.5	1 in 200	1	>=1 and <3	69.2	OK!

(2) The sewage from FDP 1 discharge into DN375 Sewer No. 1 at FMH10-71 with upstream from Sung Wong Toi Park. Then the DN375 connect to 600mm sewer through FMH10_70 (Drawing referred to page 10 and Manhole & Pipe details referred to Page 13)

The Estimated ADWF from FDP1= 50 m³/day

(Extracted from Infrastructure Review Report (IRR) of KTD

Upstream from Sung Wong Toi Park= 8.4 m³/day Engineering Study CE35/2006(CE) Appendix 4.02-2 Page 123

Estimated Flow of Sub-Catchment B Sub-Planning

Estimated ADWF from Public Sports Ground and Upstream from Sung Wong Toi Park= 8.4+50= 58.4 m³/day

Pipe Size (DN)	Up Stream Manhole	Down Stream Manhole	Estimated ADWF from Public Sports Ground and Upstream from Sung Wong Toi Park		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow (l/sec)	Pipe Material	Pipe Roughness Ks mm	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
375	FMH10_71	FMH10_70	58.40	0.68	216	8	5.41	precast concrete pipe	1.5	1 in 200	1.1	>=1 and <3	120	OK!

Pipe Size	Up Stream Manhole	Down Stream Manhole	Estimated ADWF from Public Sports Ground and Upstream from Sung Wong Toi Park		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow	Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
600	FMH10_70	FMH10_80	58.40	0.68	216	8	5.41	precast concrete pipe	1.5	1 in 240	1.4	>=1 and <3	400	OK!

- (3) **The 300mm sewer pipe collecting sewage from Public Sports Ground through Foulwater Discharge Point FDP 2 (Drawing referred to page 10 and Manhole & Pipe details referred to Page 13 and 21)**

Pipe Size	Up Stream Manhole	Down Stream Manhole	Estimated ADWF from Public Sports Ground		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow	Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
300	FMH10_80a	FMH10_80	207.6	2.40	769	8	19.22	precast concrete pipe	1.5	1 in 150	1.1	>=1 and <3	80	OK!

- (4) **The sewage from FDP 2 discharge into Sewer No. 1 at FMH10-80 and the Sewer enlarge from DN600 to DN750. (Drawing referred to page 10 & 11 and Manhole & Pipe details referred to Page 13)**

Pipe Size	Up Stream Manhole	Down Stream Manhole	Estimated ADWF from Public Sports Ground and upstream		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow	Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
750	FMH10_80	FMH10_270	266.00	3.08	985	8	24.63	precast concrete pipe	1.5	1 in 250	1.6	>=1 and <3	700	OK!

- (5) **The 300mm sewer pipe collecting sewage from Indoor Sports Centre through Foulwater Discharge Point FDP 3 (Drawing referred to page 11 and Manhole & Pipe details referred to Page 13 and 21)**

Pipe Size	Up Stream Manhole	Down Stream Manhole	Estimated ADWF from Public Sports Ground and Indoor Sports Centre		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow	Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
300	FMH10_270a	FMH10_270	191.72	2.22	710	8	17.75	precast concrete pipe	1.5	1 in 150	1.1	>=1 and <3	80	OK!

- (6) **The sewage from FDP 3 discharge into Sewer No. 2 at FMH10-270 and the Sewer enlarge from DN750 to DN900. Then the DN900 connect to 750mm twin pipe. (Drawing referred to page 11 & 12 and Manhole & Pipe details referred to Page 13)**

Pipe Size	Up Stream Manhole	Down Stream Manhole	Estimated ADWF from Public Sports Ground and Indoor Sports Centre and Catchment Area B		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow	Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
900	FMH10_270	FMH10_290	457.72	5.30	1695	6	31.79	precast concrete pipe	1.5	1 in 250	1.8	>=1 and <3	1200	OK!

(7) **The 750mm twin pipe to Pumping Station PS2**
(Drawing referred to page 12 & 14 and Manhole & Pipe details referred to Page 13 & 15)

Twin Pipe Size	Up Stream	Down Stream	Design Peak Flow of PS2		Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			OK!
			m ³ /day	l/sec				Velocity	Required Velocity	Capacity of twin pipe	
(DN)	Manhole	Manhole	m ³ /day	l/sec		mm		(m/sec)	(m/sec)	(l/sec)	
750	FMH10_290	FMH10_340	43286.40	501.00	precast concrete pipe	1.5	1 in 250	1.5	>=1 and <3	1200	OK!

Twin Pipe Size	Up Stream	Down Stream	Design Peak Flow of PS2		Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			OK!
			m ³ /day	l/sec				Velocity	Required Velocity	Capacity of twin pipe	
(DN)	Manhole	Manhole	m ³ /day	l/sec		mm		(m/sec)	(m/sec)	(l/sec)	
750	FMH10_340	FMH10_345	43286.40	501.00	precast concrete pipe	1.5	1 in 216	1.6	>=1 and <3	1300	OK!

Twin Pipe Size	Up Stream	Down Stream	Design Peak Flow of PS2		Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			OK!
			m ³ /day	l/sec				Velocity	Required Velocity	Capacity of twin pipe	
(DN)	Manhole	Manhole	m ³ /day	l/sec		mm		(m/sec)	(m/sec)	(l/sec)	
750	FMH10_345	FMH10_350	43286.40	501.00	precast concrete pipe	1.5	1 in 200	1.7	>=1 and <3	1400	OK!

(8) **The 300mm sewer pipe collecting sewage from Indoor Sports Centre through Foulwater Discharge Point FDP 4**
(Drawing referred to page 14 and Manhole & Pipe details referred to Page 13,15 and 21)

Pipe Size	Up Stream Manhole	Down Stream Manhole	Estimated ADWF from Public Sports Ground and Indoor Sports Centre		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow	Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			OK!
			m ³ /day	l/sec							Velocity	Required Velocity	Capacity of pipe	
(DN)			m ³ /day	l/sec				mm			(m/sec)	(m/sec)	(l/sec)	
300	2D1_1A	FMH10_350	80.00	0.93	296	8	7.41	vitrified clay pipes	0.6	1 in 240	1	>=1 and <3	63.1	OK!

(9) **The sewage from FDP 4 discharge into Sewer No. 1 at FMH10-350 and connect to 750mm twin pipe.**
(Drawing referred to page 14 & 16 and Manhole & Pipe details referred to Page 13 & 15)

Twin Pipe Size	Up Stream	Down Stream	Design Peak Flow of PS2		Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			OK!
			m ³ /day	l/sec				Velocity	Required Velocity	Capacity of twin pipe	
(DN)	Manhole	Manhole	m ³ /day	l/sec		mm		(m/sec)	(m/sec)	(l/sec)	
750	FMH10_350	FMH10_370	43286.40	501.00	precast concrete pipe	1.5	1 in 188	1.8	>=1 and <3	1600	OK!

Twin Pipe Size	Up Stream	Down Stream	Design Peak Flow of PS2		Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			OK!
			m ³ /day	l/sec				Velocity	Required Velocity	Capacity of twin pipe	
(DN)	Manhole	Manhole	m ³ /day	l/sec		mm		(m/sec)	(m/sec)	(l/sec)	
750	FMH10_370	PS2	43286.40	501.00	precast concrete pipe	1.5	1 in 160	2	>=1 and <3	1800	OK!

As the sewer line is adequate to collect sewage from the Public Sports Ground and Indoor Sports Centre to the PS2, including catchment for the 750mm twin pipe, no upgrading works is required. No adverse impact will be imposed.

(III) Sewer From PS2 To NPS (Drawing referred to page 16 to 21)

A 600mm sewer collecting sewage from FDP5 for the Main Stadium and a 300mm sewer collecting sewage from FDP6 for Hotel Block and Office Block, both discharge into a 750mm diameter sewer along Road D2 which subsequently discharges into Pumping Station NPS, hereinafter called Sewer No. 2.

(Drawings referred to Appendix 7.3 page 16 to 20 and Manhole & Pipe Schedule referred to Page 15)

(1) 600 mm dia. sewer from Main Stadium discharge from proposed foulwater discharge points FDP5 (Drawing referred to page 17 & 19 and Latest Pipe details referred to Page 21)

Pipe Size	Up Stream Manhole	Down Stream Manhole	Estimated ADWF Flow of Main Stadium		Contributing population for ADWF	Peaking Factor for sewers (including stormwater allowance)	Peak Flow	Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
600	FMH12_0_10	FMH12_0_20	1,856.40	21.49	6876	5	107.43	precast concrete pipe	1.5	1 in 163	1.7	>=1 and <3	480	OK!

(2) 300 mm dia. sewer from Hotel Block and Office Block discharge from proposed foulwater discharge points FDP6 (Drawing referred to page 17 to 20 and Latest Pipe details referred to Page 21)

Pipe Size	Up Stream Manhole	Down Stream Manhole	Estimated ADWF Flow of Hotel Block and Office Block		Contributing population for ADWF	Peaking Factor (including stormwater allowance)	Peak Flow	Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec							Velocity (m/sec)	Required Velocity (m/sec)	Capacity of pipe (l/sec)	
300	FMH12_5_40	FMH12_5_50	875.60	10.13	3243	6	60.81	vitrified clay pipe	0.6	1 in 80	1.7	>=1 and <3	109.6	

(3) Single 750 mm dia. sewer along Road D2 receiving the sewers from FDP5 for MPSC Chainage from 442 meter to 636 meter, Drawing referred to 17 & 19

Pipe Size	Up Stream Manhole	Down Stream Manhole	Design Peak Flow of NPS		Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec				Velocity (m/sec)	Required Velocity (m/sec)	Capacity (l/sec)	
750	DC1	FMH12_0_60	69552	805.00	precast concrete pipe	1.5	1 in 80	2.7	>=1 and <3	1200	OK!

As the 750mm sewer line is adequate to collect sewage from the Main Stadium, Hotel and Office Block to NPS, including the rising mains from PS2, no upgrading works is required for the sewer. No adverse impact will be imposed. If necessary the infrastructure provisions by CEDD would cater for the updated sewage estimation of MPSC.

(4) 750mm twin pipe to Pumping Station NPS

Twin Pipe Size	Up Stream Manhole	Down Stream Manhole	Design Peak Flow of NPS		Pipe Material	Pipe Roughness Ks	Gradient	Based on Chart			
			m ³ /day	l/sec				Velocity (m/sec)	Required Velocity (m/sec)	Capacity of twin pipe (l/sec)	
750	FMH12_0_60	FMH12_0_80	69552	805.00	precast concrete pipe	1.5	1 in 95	2.5	>=1 and <3	2200	OK!

As the sewer line is adequate to collect sewage from the Main Stadium, Hotel and Office Block to NPS, including the rising mains from PS2, no upgrading works is required for the rising mains. No adverse impact will be imposed.

List of surfaces with roughness $k_s = 0.6 \text{ mm}$

Good examples of	Old tuberculated water mains with slight attack Concrete pipes, monolithic construction against rough forms Glazed brickwork
Normal examples of	Rusty wrought iron Wood stave pipes, planed plank conduits Concrete pipes, monolithic construction against steel forms uPVC sewers slimed to about half depth; velocity when flowing half full approximately 0.75 m/s Asbestos cement sewers slimed to about half depth; velocity, when flowing half full, approximately 1.2m/s
Poor examples of	Uncoated cast iron Tate relined pipes Precast concrete pipes with 'O' ring joints Clayware sewers slimed to about half depth; velocity, when flowing half full, approximately 1.2m/s Sewer rising mains, mean velocity 1 m/s

Discharge Q (l/s) for pipes flowing full

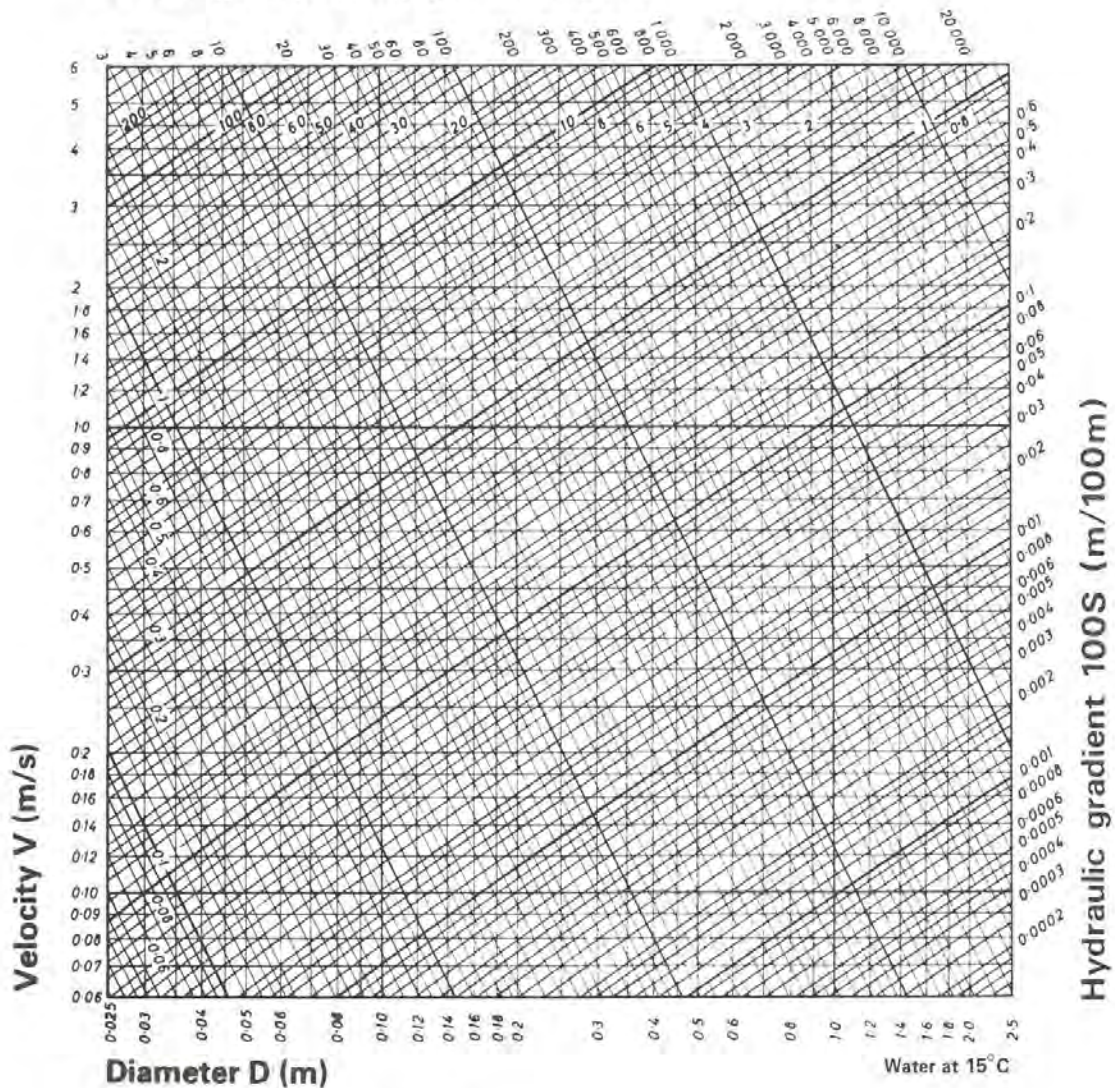


Fig 8 $k_s = 0.6 \text{ mm}$

List of surfaces with roughness $k_s = 1.5 \text{ mm}$

- Good examples of Old tuberculated water mains with moderate attack
Well pointed brickwork
- Normal examples of Old tuberculated water mains with slight attack
Glazed brickwork
Clayware sewers slimed to about half depth; velocity, when flowing half full, approximately 0.75m/s
Concrete sewers, spun or vertically cast, slimed to about half depth; velocity, when flowing half full, approximately 1.2m/s
- Poor examples of Wood stave pipes, planed plank conduits
Asbestos cement sewers slimed to about half depth; velocity, when flowing half full, approximately 1.2m/s

Discharge Q (l/s) for pipes flowing full

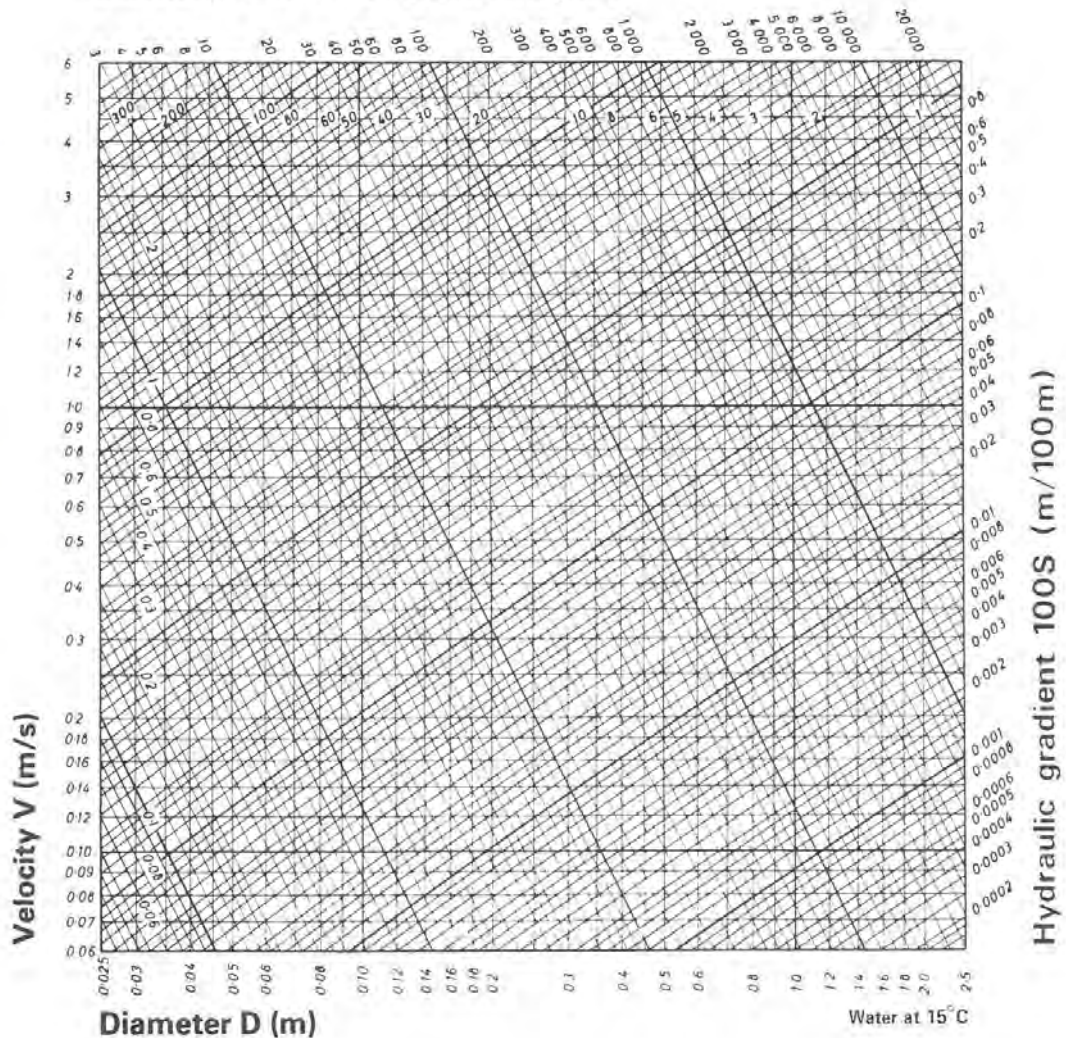
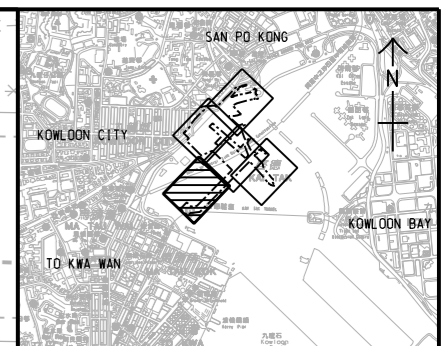
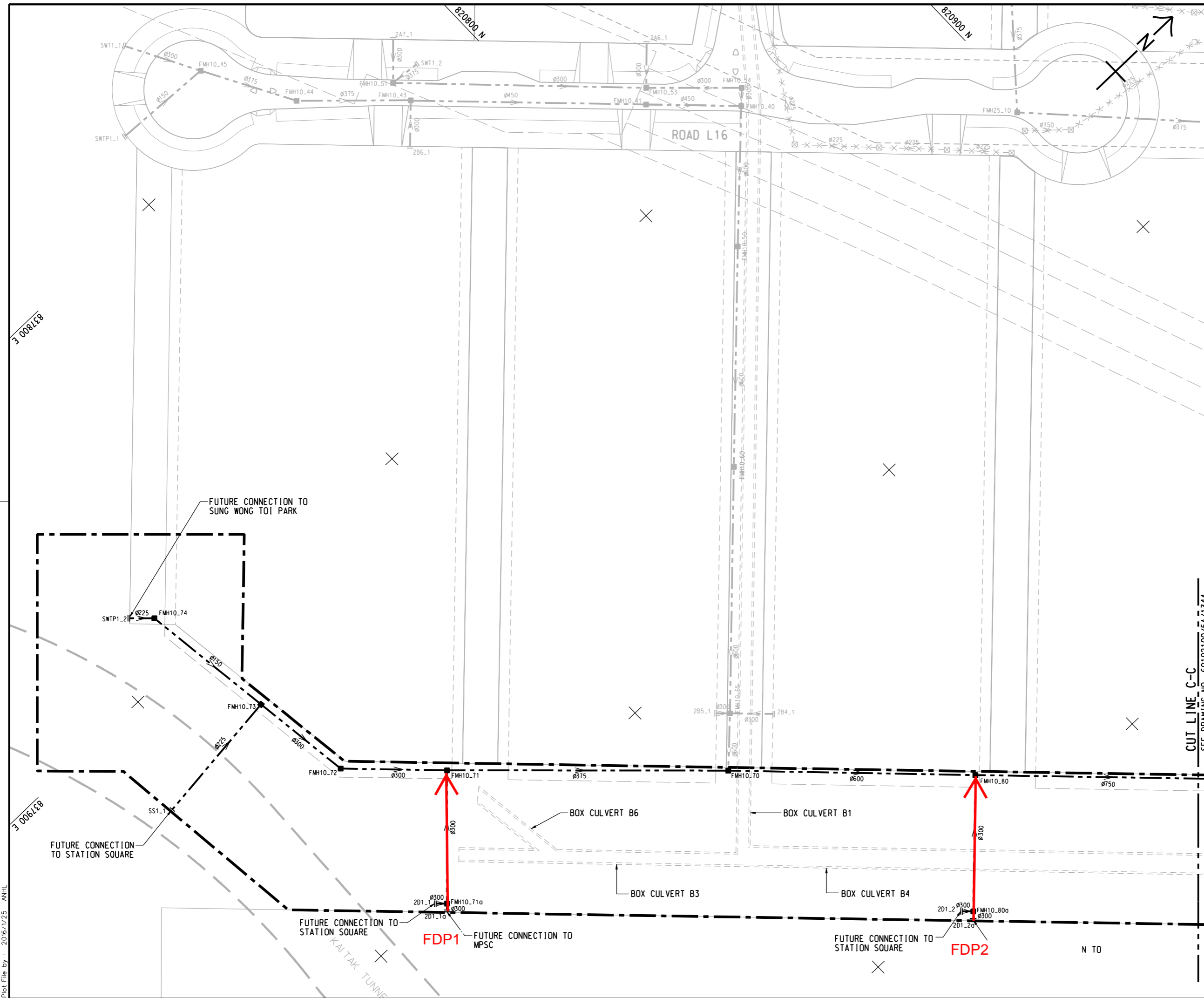


Fig 9 $k_s = 1.5 \text{ mm}$



KEY PLAN
SCALE A1 1 : 25000
A3 1 : 50000

- NOTES:**
1. FOR NOTES AND LEGEND SEE DRAWING NO. 60102100/5A/1341.
 2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/5A/1341, 1342, 1344 AND 1345.

REV.	DESCRIPTION	BY	CHKD	DATE

CEDD 土木工程拓展署
Civil Engineering and Development Department

KAI TAK DEVELOPMENT

KAI TAK DEVELOPMENT - STAGE 5A INFRASTRUCTURE AT FORMER NORTH APRON AREA

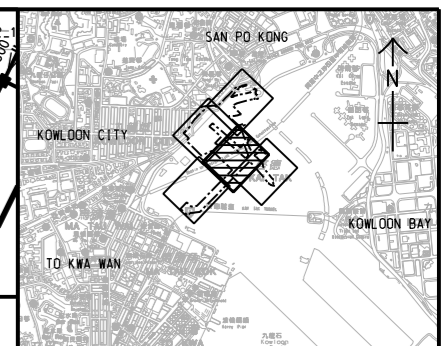
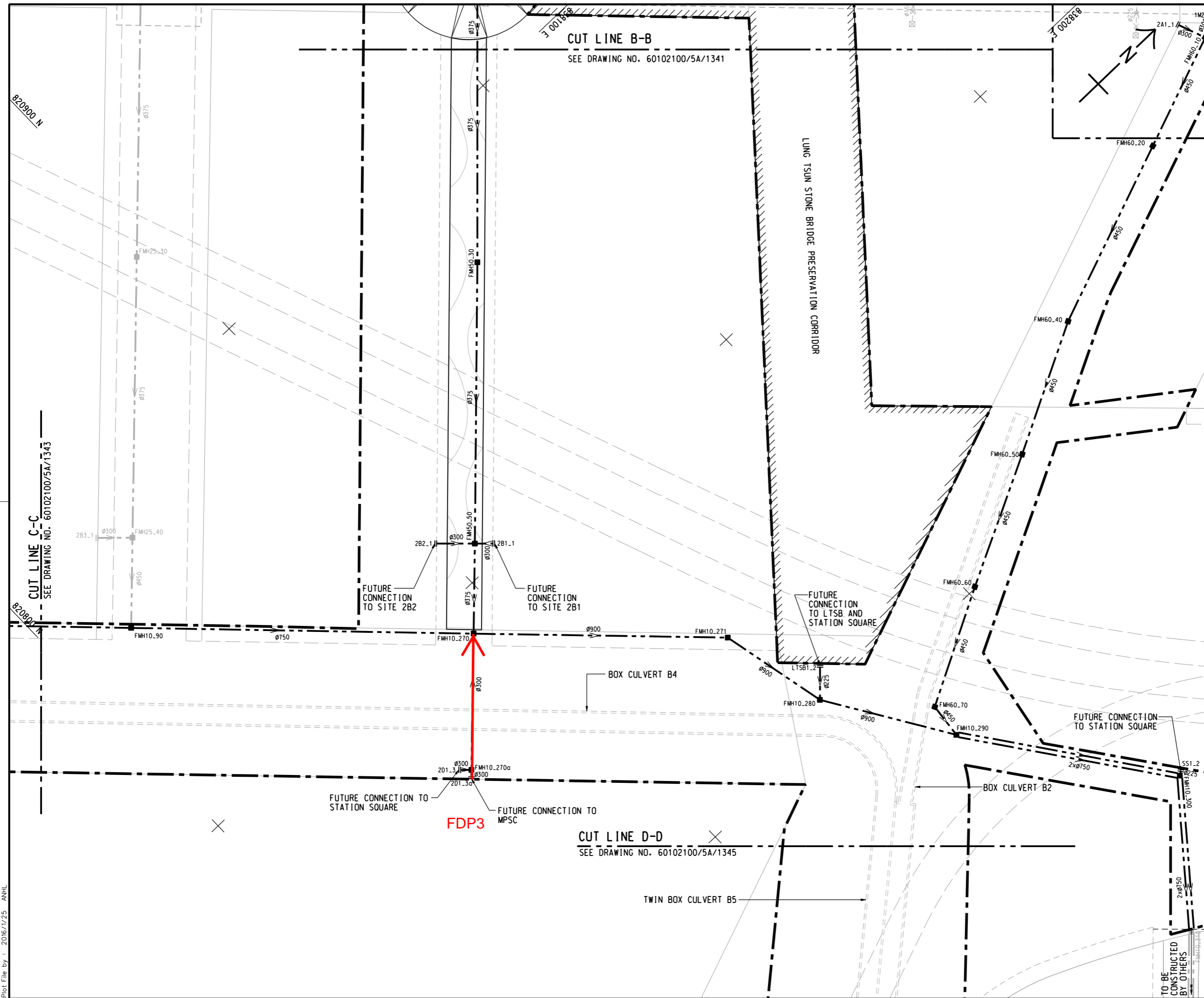
SEWERAGE - LAYOUT PLAN
SHEET 3 OF 5

AECOM

DRG. NO. 圖紙編號 **60102100/5A/01343**

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SCALE 比例 A1 1 : 500 A3 1 : 1000		
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REV.	DESCRIPTION	BY	CHK.	DATE

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Civil Engineering and Development Department

KAI TAK DEVELOPMENT
KAI TAK DEVELOPMENT - STAGE 5A INFRASTRUCTURE AT FORMER NORTH APRON AREA

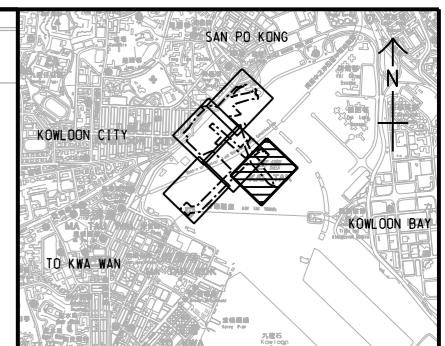
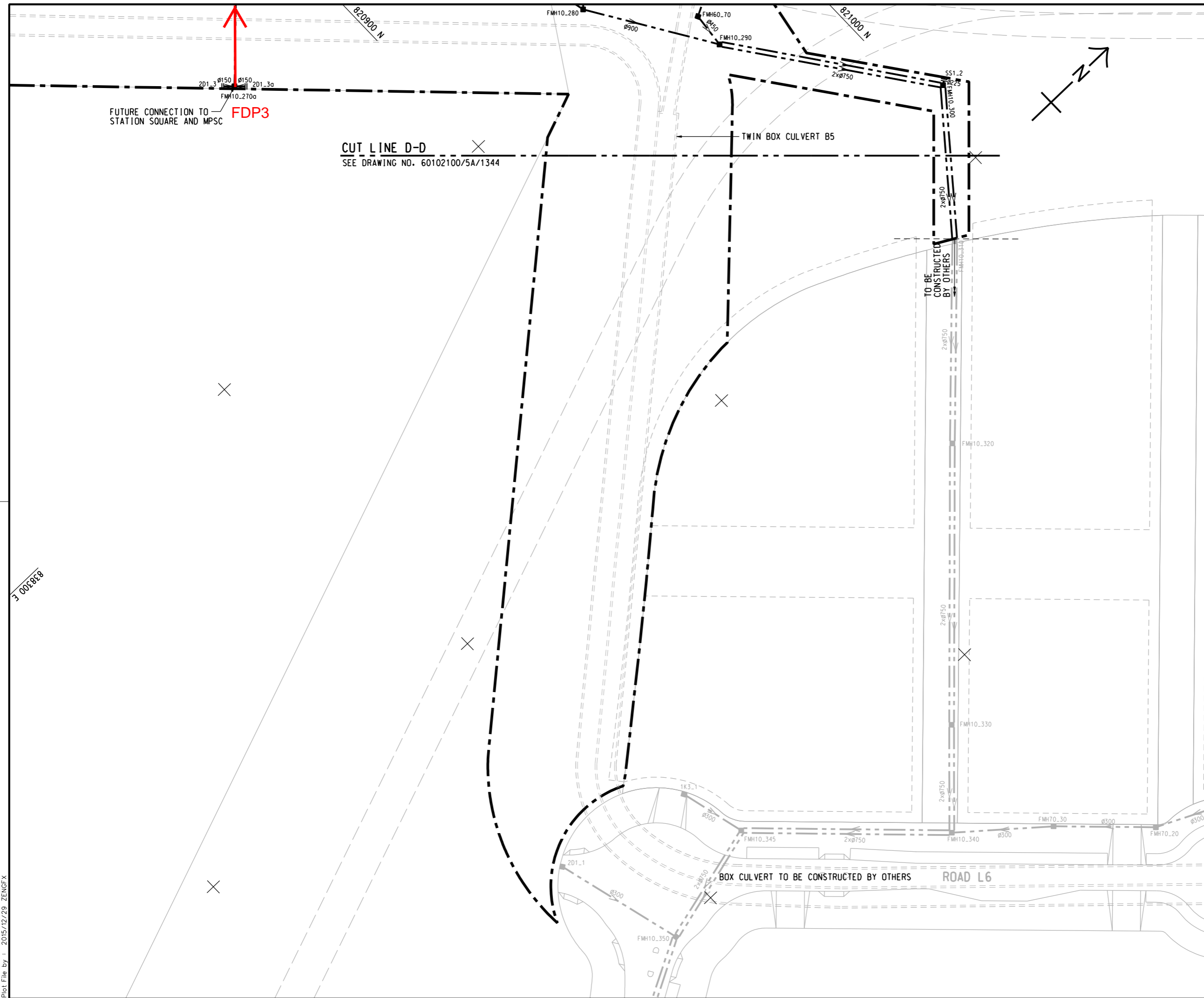
SEWERAGE - LAYOUT PLAN
SHEET 4 OF 5

AECOM

DRG.NO. 60102100/5A/01344

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DRAWN BY AHL	STATUS 	
SCALE A1 1 : 500 A3 1 : 1000		
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KEY PLAN
SCALE A1 1 : 25000
A3 1 : 50000

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REV.	DESCRIPTION	BY	CHK.	DATE

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Civil Engineering and Development Department

KAI TAK DEVELOPMENT
KAI TAK DEVELOPMENT - STAGE 5A INFRASTRUCTURE AT FORMER NORTH APRON AREA

SEWERAGE - LAYOUT PLAN
SHEET 5 OF 5

AECOM

DRG. NO. 圖紙編號		60102100/5A/01345	
DESIGNED BY 設計	CONTRACT NO. 合約編號	P. DR. APPROVED 核准人	DATE 日期
DRAWN BY 繪圖 AHL SCALE A1 1 : 500 A3 1 : 1000 DIMENSIONS ARE IN 尺寸單位 METRES	STATUS 階段 KL/2015/02	© COPYRIGHT RESERVED 版權所有	

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MANHOLE SCHEDULE

U/S M.H.	D/S M.H.	U/S G.L. (mPD)	D/S G.L. (mPD)	GRADIENT 1 IN	U/S I.L. (mPD)	D/S I.L. (mPD)	PIPE SIZE (mm)	U/S M.H. TYPE	PIPE MATERIAL	BEDDING TYPE
FMH10_74	FMH10_73	6.100	6.450	350	4.830	4.719	225	D1	CONCRETE	B
FMH10_73	FMH10_72	6.450	6.400	320	4.569	4.478	300	E1	CONCRETE	B
FMH10_72	FMH10_71	6.400	6.380	320	4.478	4.383	300	E1	CONCRETE	B
FMH10_71	FMH10_70	6.380	5.912	200	4.383	3.983	300	E1	CONCRETE	B
FMH10_70	FMH10_80	5.912	5.450	240	0.549	0.256	600	L/BACKDROP3	CONCRETE	C.S.
FMH10_80	FMH10_90	5.450	5.250	250	0.106	-0.250	750	L/BACKDROP3	CONCRETE	C.S.
FMH10_90	FMH10_270	5.250	5.150	250	-1.006	-1.386	750	S1	CONCRETE	C.S.
FMH10_270	FMH10_271	5.150	5.250	250	-1.536	-1.826	900	S1	CONCRETE	C.S.
FMH10_271	FMH10_280	5.250	5.350	250	-1.926	-2.052	900	S1	CONCRETE	C.S.
FMH10_280	FMH10_290	5.350	5.500	250	-2.052	-2.212	900	S1	CONCRETE	C.S.
FMH10_290	FMH10_300	5.500	5.500	250	-2.212	-2.465	750	S2	CONCRETE	C.S.
FMH10_300	FMH10_310	5.500	5.500	250	-2.465	-2.637	750	S3	CONCRETE	C.S.
SWTP1_2	FMH10_74	6.100	6.100	350	4.850	4.830	225	TEMPORARY PLUG	CONCRETE	B
SS1_1	FMH10_73	6.450	6.450	350	5.200	5.088	225	TEMPORARY PLUG	CONCRETE	B
2D1_1	FMH10_71a	6.056	6.380	200	4.631	4.613	300	TEMPORARY PLUG	CONCRETE	B
2D1_1a	FMH10_71a	6.056	6.380	200	4.631	4.613	300	TEMPORARY PLUG	CONCRETE	B
FMH10_71a	FMH10_71	6.380	6.380	200	4.613	4.468	300	E1	CONCRETE	B
2D1_2	FMH10_80a	6.250	5.450	150	5.025	5.001	300	TEMPORARY PLUG	CONCRETE	B
2D1_2a	FMH10_80a	6.250	5.450	150	5.025	5.001	300	TEMPORARY PLUG	CONCRETE	B
FMH10_80a	FMH10_80	5.450	5.450	150	5.001	4.730	300	D1	CONCRETE	B
2D1_3	FMH10_270a	5.200	5.150	150	-0.650	-0.674	300	TEMPORARY PLUG	CONCRETE	B
2D1_3a	FMH10_270a	5.200	5.150	150	-0.650	-0.674	300	TEMPORARY PLUG	CONCRETE	B
FMH10_270a	FMH10_270	5.150	5.150	150	-0.674	-0.946	300	L	CONCRETE	B
LTSB1_2	FMH10_280	5.250	5.350	240	3.750	3.662	225	TEMPORARY PLUG	CONCRETE	B
SS1_2	FMH10_300	5.500	5.500	100	3.138	3.120	225	TEMPORARY PLUG	CONCRETE	B

MANHOLE SCHEDULE

U/S M.H.	D/S M.H.	U/S G.L. (mPD)	D/S G.L. (mPD)	GRADIENT 1 IN	U/S I.L. (mPD)	D/S I.L. (mPD)	PIPE SIZE (mm)	U/S M.H. TYPE	PIPE MATERIAL	BEDDING TYPE
FMH50_10	FMH50_10a	6.040	6.150	240	4.719	4.645	375	D1	CONCRETE	B
FMH50_10a	FMH50_20	6.150	6.300	240	4.645	4.591	375	E1	CONCRETE	B
FMH50_20	FMH50_30	6.300	6.200	240	4.191	3.877	375	E1	CONCRETE	B
FMH50_30	FMH50_50	6.200	5.970	240	3.877	3.543	375	E1	CONCRETE	B
FMH50_50	FMH10_270	5.970	5.150	150	3.543	3.373	375	E1	CONCRETE	B
2A2_1	FMH50_10	6.040	6.040	240	4.840	4.794	300	TEMPORARY PLUG	CONCRETE	B
2A3_1	FMH50_10	6.040	6.040	240	4.896	4.794	300	TEMPORARY PLUG	CONCRETE	B
LTSB1_1	FMH50_10a	6.150	6.150	240	4.808	4.720	300	TEMPORARY PLUG	CONCRETE	B
2B1_1	FMH50_50	5.970	5.970	120	3.661	3.618	300	TEMPORARY PLUG	CONCRETE	B
2B2_1	FMH50_50	5.970	5.970	120	3.709	3.618	300	TEMPORARY PLUG	CONCRETE	B
FMH60_10	FMH60_20	6.200	6.200	220	3.621	3.465	450	E1	CONCRETE	B
FMH60_20	FMH60_40	6.200	6.200	220	3.465	3.214	450	E1	CONCRETE	B
FMH60_40	FMH60_50	6.200	6.200	220	3.214	3.032	450	E1	CONCRETE	B
FMH60_50	FMH60_60	6.200	6.200	220	3.032	2.850	450	F1	CONCRETE	B
FMH60_60	FMH60_70	6.200	6.200	220	2.850	2.686	450	F1	CONCRETE	B
FMH60_70	FMH10_290	6.200	5.500	220	2.686	2.641	450	F1	CONCRETE	B
2A1_1	FMH60_10	6.200	6.200	240	3.806	3.771	300	TEMPORARY PLUG	CONCRETE	B
1M1_1	FMH60_10	6.200	6.200	240	3.790	3.621	450	TEMPORARY PLUG	CONCRETE	B
1M2_1	FMH60_10	6.200	6.200	240	3.807	3.771	300	TEMPORARY PLUG	CONCRETE	B

NOTES:

- FOR GENERAL NOTES AND ABBREVIATION SEE DRAWING NO. 60102100/5A/1340.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/5A/1341 TO 1345.
- FOR DETAILS OF STANDARD MANHOLE, SEE DSD STANDARD DRAWINGS.
- FOR DETAILS OF SPECIAL MANHOLES, SEE DRAWING NOS. 60102100/5A/1350 TO 1353.
- FOR DETAILS OF CONCRETE SURROUND FOR PIPES, SEE DRAWING NO. 60102100/5A/1349.
- THE EXACT INVERT LEVELS OF FMH10_310, U/S AND D/S SHOULD MATCH WITH THE INVERT LEVELS OF UPSTREAM OR DOWNSTREAM SEWER AND SHOULD BE DETERMINED ON SITE.

REV.	DESCRIPTION	BY	CHKD	DATE



KAI TAK DEVELOPMENT

KAI TAK DEVELOPMENT - STAGE 5A INFRASTRUCTURE AT FORMER NORTH APRON AREA

SEWERAGE - MANHOLE SCHEDULE

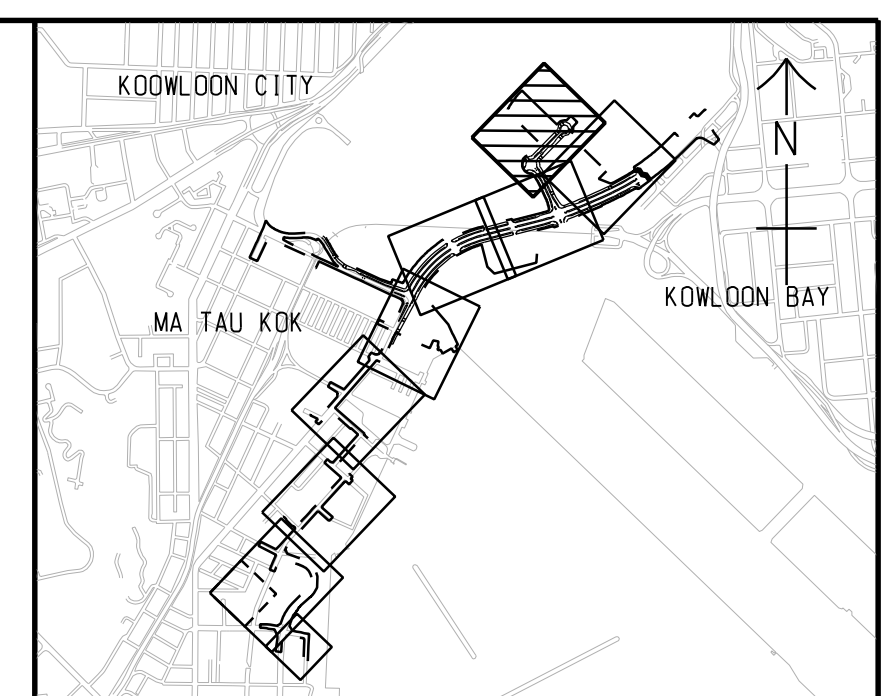
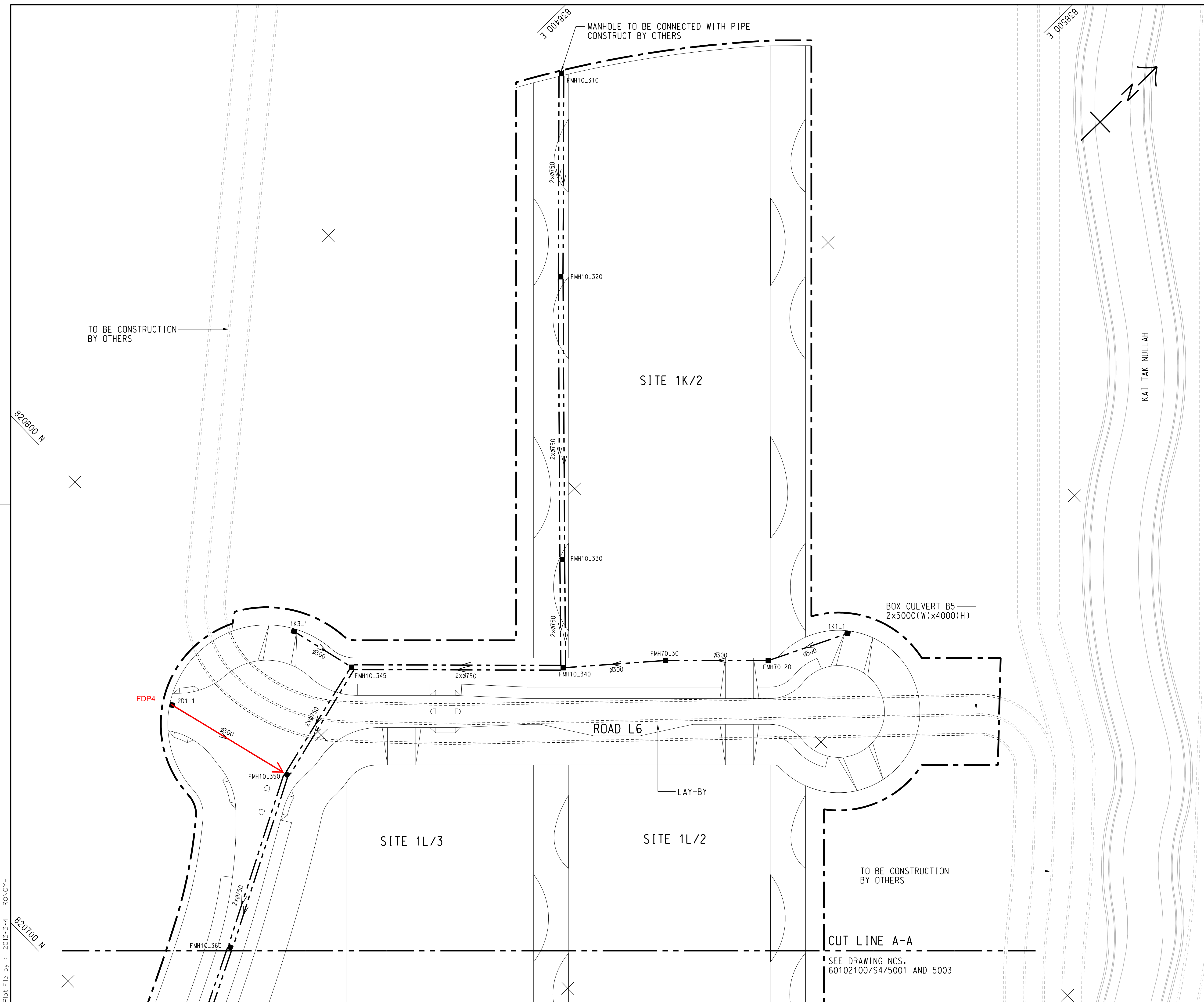


DRG. NO. 60102100/5A/01348

DESIGNED BY: CRH
 CONTRACT NO.: KL/2015/02
 P. BY: APPROVED

SCALE: AS SHOWN
 STATUS: FOR ISSUE

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KEY PLAN
SCALE A1 1 : 25000
A3 1 : 50000

- NOTES:**
- FOR NOTES AND LEGEND, REFER TO DRAWING NO. 60102100/S4/5001.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/S4/5001 AND 5003 TO 5008.

A	WORKING DRAWING	DYHP/SCWC	OCT.13
-	TENDER DRAWING	DYHP/SCWC	MAR.13
REV.	DESCRIPTION	DATE	DATE
修訂	內容摘要	日期	日期



KAI TAK DEVELOPMENT

KAI TAK DEVELOPMENT -
STAGE 4 INFRASTRUCTURE AT
FORMER NORTH APRON AREA

SEWERAGE - LAYOUT PLAN

SHEET 2 OF 8



DRG.NO. 圖紙編號 **60102100/S4/5002A**

DESIGNED BY LXL	CONTRACT NO. KL/2012/03	Pr. Dir. APPROVED DML
DRAWN BY GXH	STATUS WORKING DRAWING	
SCALE A1 1 : 500 A3 1 : 1000		
DIMENSIONS ARE IN METRES		© COPYRIGHT RESERVED 版權 所 有

Plot File By : 2013-3-4 RONGYH

MANHOLE SCHEDULE

U/S M.H.	D/S M.H.	U/S G.L. (mPD)	D/S G.L. (mPD)	GRADIENT 1 IN	U/S I.L. (mPD)	D/S I.L. (mPD)	PIPE SIZE (mm)	U/S M.H. TYPE	PIPE MATERIAL	BEDDING	PIPE CLASS	REMARK
FMH10_310	FMH10_320	5.50	5.50	250	-3.22	-3.45	2x750	S1	CONCRETE	C.S.	H	NOTE 8
FMH10_320	FMH10_330	5.50	5.50	250	-3.45	-3.77	2x750	S1	CONCRETE	C.S.	H	
FMH10_330	FMH10_340	5.50	5.84	250	-3.77	-3.89	2x750	S1	CONCRETE	C.S.	H	
FMH10_340	FMH10_345	5.84	6.26	216	-3.89	-4.17	2x750	S2/BACKDROP3	CONCRETE	C.S.	H	
FMH10_345	FMH10_350	6.26	6.25	200	-4.17	-4.35	2x750	S2/BACKDROP3	CONCRETE	C.S.	H	
FMH10_350	FMH10_360	6.25	5.38	188	-4.35	-4.62	2x750	S1/BACKDROP3	CONCRETE	C.S.	H	
FMH10_360	FMH10_370	5.38	5.46	188	-4.62	-4.89	2x750	S1	CONCRETE	C.S.	H	
FMH10_370	PS2	5.46	5.44	160	-4.89	-4.98	2x750	S2/BACKDROP3	CONCRETE	C.S.	H	
1K1_1	FMH70_20	5.90	5.75	240	3.35	3.25	300	E1	V.C.	B	120	
FMH70_20	FMH70_30	5.75	5.66	200	3.25	3.11	300	E1	V.C.	B	120	
FMH70_30	FMH10_340	5.66	5.84	200	3.11	2.96	300	E1	V.C.	B	120	
1K3_1	FMH10_345	6.36	6.26	240	3.20	3.12	300	F1	V.C.	B	120	
2D1_1	FMH10_350	6.36	6.25	240	4.24	4.08	300	F1	V.C.	B	120	
FMH90_20	FMH90_30	5.12	5.33	140	3.68	3.40	300	D1	V.C.	B	120	
FMH90_30	FMH90_40	5.33	5.38	140	3.40	3.15	300	E1	V.C.	B	120	
FMH90_40	FMH90_50	5.38	5.16	140	3.15	2.87	300	E1	V.C.	B	120	
FMH90_50	FMH90_60	5.16	4.98	140	2.87	2.67	300	E1	V.C.	B	120	
FMH90_60	FMH90_65	4.98	5.03	140	2.67	2.48	300	E1	V.C.	B	120	
FMH90_65	FMH90_70	5.03	4.75	140	1.88	1.76	300	F1	V.C.	B	120	
FMH90_70	FMH90_80	4.75	5.11	140	1.76	1.53	300	E1	V.C.	B	120	
FMH90_80	FMH10_370	5.11	5.46	140	1.53	1.35	300	F1	V.C.	B	120	
1P1_1	FMH90_20	5.19	5.12	240	3.89	3.81	300	D1	V.C.	B	120	
1L4_1	FMH90_20	5.15	5.12	240	3.75	3.68	300	D1	V.C.	B	120	
1L1_1	FMH100_10	5.60	5.00	240	3.80	3.78	300	E1	V.C.	B	120	
FMH100_10	FMH100_20	5.00	4.90	240	3.78	3.62	300	D1	V.C.	B	120	
FMH100_20	FMH100_30	4.90	5.02	240	3.62	3.51	300	D1	V.C.	B	120	
FMH100_30	FMH100_40	5.02	5.20	240	3.48	3.32	300	E1	V.C.	B	120	
FMH100_40	FMH100_50	5.20	5.25	240	3.32	3.19	300	E1	V.C.	B	120	
FMH100_50	FMH90_50	5.25	5.16	140	3.19	3.02	300	E1	V.C.	B	120	
1L2_1	FMH100_30	5.20	5.02	240	3.50	3.48	300	E1	V.C.	B	120	
1L3_1	FMH100_50	5.20	5.25	240	3.50	3.48	300	E1	V.C.	B	120	
FMH110_90	FMH110_100	5.88	5.88	240	3.53	3.47	300	E1	V.C.	B	120	
FMH110_100	FMH110_110	5.88	5.88	90	2.87	2.68	300	F1	V.C.	B	120	
FMH110_110	FMH90_65	5.88	5.03	90	2.68	2.46	300	F1	V.C.	B	120	
FMH120_10	DC1	4.91	5.99	100	2.16	1.76	600	E1	CONCRETE	B	H	
DC1	FMH120_30	5.99	5.56	80	1.61	0.79	750	DISCHARGE CHAMBER DC1	CONCRETE	B	H	
FMH120_30	FMH120_40	5.56	5.07	80	0.79	0.15	750	L	CONCRETE	B	H	
FMH120_40	FMH120_50	5.07	4.57	80	0.15	-0.40	750	L	CONCRETE	B	H	
FMH120_50	FMH120_60	4.57	4.28	80	-0.40	-0.78	750	L/BACKDROP3	CONCRETE	B	H	
FMH120_60	FMH120_70	4.28	4.05	95	-1.32	-2.16	2x750	S6	CONCRETE	C.S.	H	BY TRENCHLESS METHOD
FMH120_70	FMH120_80	4.05	3.90	95	-2.16	-2.41	2x750	S6/BACKDROP3	CONCRETE	B	H	
FMH120_80	NPS	3.90	3.76	120	-2.41	-2.45	2x900	S2/BACKDROP2	CONCRETE	B	H	
FMH125_40	FMH120_50	4.26	4.57	240	2.61	2.46	300	E1	V.C.	B	120	

MANHOLE SCHEDULE

U/S M.H.	D/S M.H.	U/S G.L. (mPD)	D/S G.L. (mPD)	GRADIENT 1 IN	U/S I.L. (mPD)	D/S I.L. (mPD)	PIPE SIZE (mm)	U/S M.H. TYPE	PIPE MATERIAL	BEDDING	PIPE CLASS	REMARK
FMH130_60	FMH130_70	3.61	3.62	250	0.87	0.80	450	E1	V.C.	B	120	
FMH130_70	FMH130_80	3.62	3.65	250	0.80	0.64	450	E1	V.C.	B	120	
FMH130_80	FMH130_90	3.65	3.85	250	0.64	0.56	450	F1	V.C.	B	120	
FMH130_90	FMH120_80	3.85	3.90	90	0.41	0.09	600	F1	CONCRETE	B	H	
DWF1	FMH140_10	4.10	4.10	150	0.26	0.22	450	-	V.C.	C.S.	120	NOTE 5
FMH140_10	FMH120_70	4.10	4.05	150	0.15	-0.05	525	-	V.C.	C.S.	120	NOTE 7
DC2	FMH1	5.65	5.47	185	3.90	3.73	2x750	DISCHARGE CHAMBER DC2	CONCRETE	C.S.	H	
FMH1	FMH2	5.47	5.30	185	3.73	3.57	2x750	S3	CONCRETE	C.S.	H	
FMH2	FMH3	5.30	5.22	185	3.57	3.50	2x750	S3	CONCRETE	C.S.	H	
FMH3	FMH4	5.22	5.38	185	3.50	3.38	2x750	S3	CONCRETE	C.S.	H	
FMH4	FMH5	5.38	5.58	185	3.38	3.22	2x750	S3	CONCRETE	C.S.	H	
FMH5	FMH6	5.58	5.12	185	3.22	3.01	2x750	S3	CONCRETE	C.S.	H	
FMH6	FMH7	5.12	4.74	185	3.01	2.90	2x750	S3	CONCRETE	C.S.	H	
FMH7	FMH8	4.74	4.85	185	2.90	2.80	2x750	S3	CONCRETE	C.S.	H	
FMH8	FMH9	4.85	4.48	185	2.80	2.75	2x750	S3	CONCRETE	C.S.	H	
FMH9	FMH10	4.48	4.40	240	1.10	1.03	2x900	S3/BACKDROP2	CONCRETE	C.S.	H	
FMH10	FMH11	4.40	5.10	240	0.63	0.60	2x900	S3	CONCRETE	C.S.	H	
FMH11	FMH4025954	5.10	5.42	240	0.05	0.04	900	S5	CONCRETE	C.S.	H	
B1	FMH2	5.32	5.30	240	3.99	3.95	300	D1	V.C.	B	120	
B2	FMH3	5.22	5.22	240	3.55	3.50	300	E1	V.C.	B	120	
B3	FMH2	5.12	5.30	240	3.62	3.57	300	E1	V.C.	B	120	

NOTES:

- FOR GENERAL NOTES AND ABBREVIATION REFER TO DRAWING NO. 60102100/S4/5000.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/S4/5001 TO 5008.
- FOR DETAILS OF STANDARD MANHOLE, REFER TO DSD STANDARD DRAWINGS.
- FOR DETAILS OF SPECIAL MANHOLES AND DISCHARGE CHAMBERS, REFER TO DRAWING NOS. 60102100/S4/5301 TO 5307 AND 5313 TO 5314.
- FOR DETAILS OF DWF1, REFER TO DRAWING NO. 60102100/S4/5312.
- FOR DETAILS OF CONCRETE SURROUND FOR TWIN PIPES, REFER TO DRAWING NO. 60102100/S4/5311.
- FMH140_10 IS SPECIAL MANHOLE TYPE S3 WITH A BASKET SCREEN INSIDE AND THE DETAILS REFER TO DRAWING NO. 60102100/S4/5312.
- THE EXACT INVERT LEVEL OF FMH10_310 SHOULD MATCH WITH THE INVERT LEVEL OF UPSTREAM SEWER AND SHOULD BE DETERMINED ON SITE.

D	WORKING DRAWING	DYHP/SCWC	OCT. 13
C	TENDER ADDENDUM NO.4	DYHP/SCWC	APR. 13
B	TENDER ADDENDUM NO.2	DYHP/SCWC	MAR. 13
A	TENDER ADDENDUM NO.1	DYHP/SCWC	MAR. 13
-	TENDER DRAWING	DYHP/SCWC	MAR. 13



KAI TAK DEVELOPMENT

KAI TAK DEVELOPMENT - STAGE 4 INFRASTRUCTURE AT FORMER NORTH APRON AREA

SEWERAGE - MANHOLE SCHEDULE

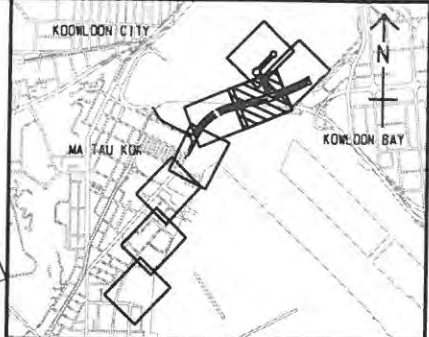
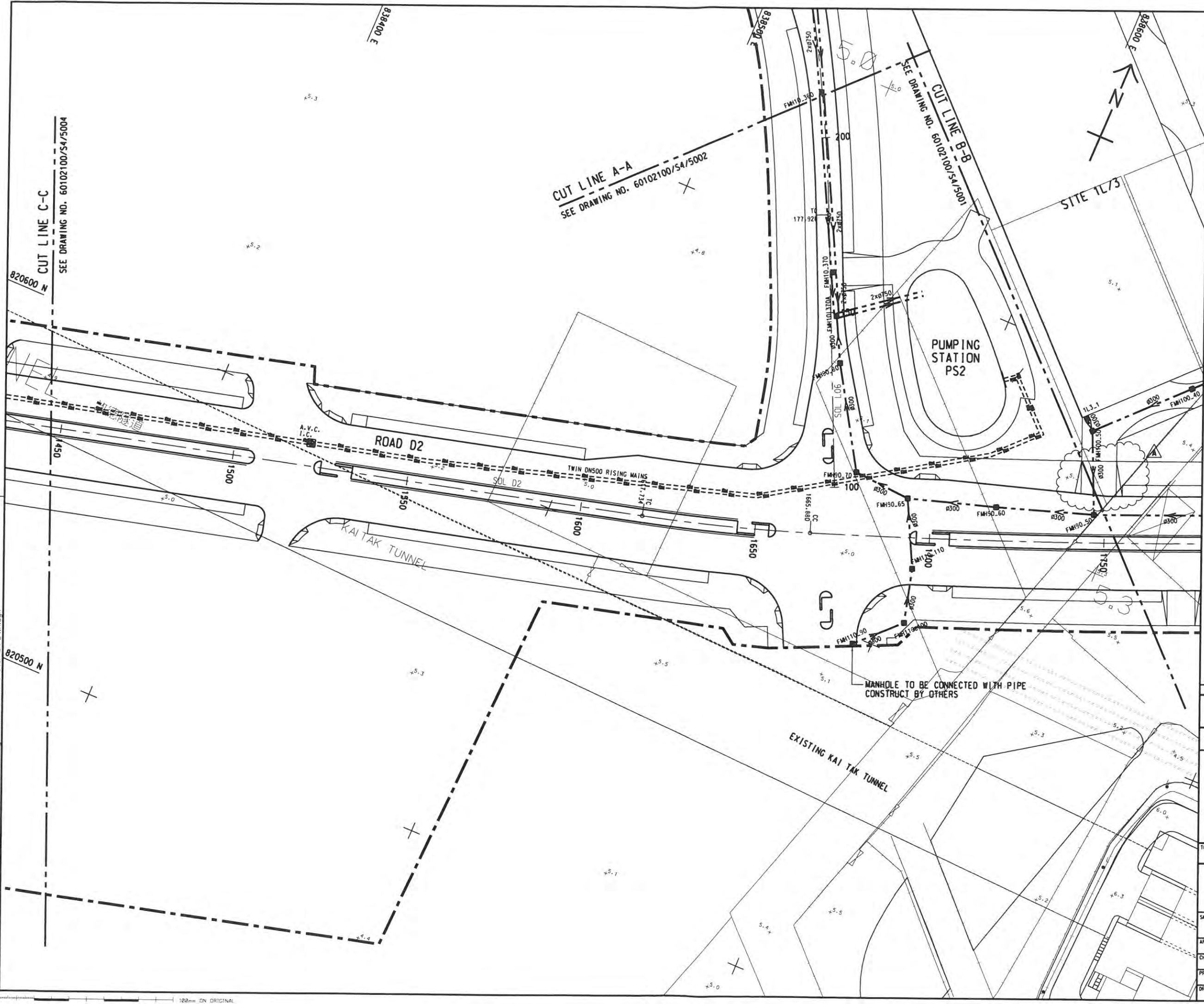


DRG.NO. 60102100/S4/5101D

DESIGNED BY: LXL	CONTRACT NO.: KL/2012/03	P. BY: APPROVED: DML
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STATUS: WORKING DRAWING

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KEY PLAN
 SCALE A1 1 : 25000
 A3 1 : 50000

- NOTES:**
- FOR NOTES AND LEGEND, REFER TO DRAWING NO. 60102100/S4/5001.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/S4/5001, 5002 AND 5004 TO 5008.

A	MINOR AMENDMENT	16/05/15	V	EWB
REV	DESCRIPTION	DATE	CHECK	APPROVE

CEDD 土木工程發展署
 Civil Engineering and Development Department

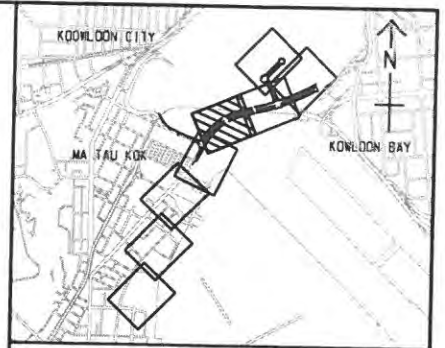
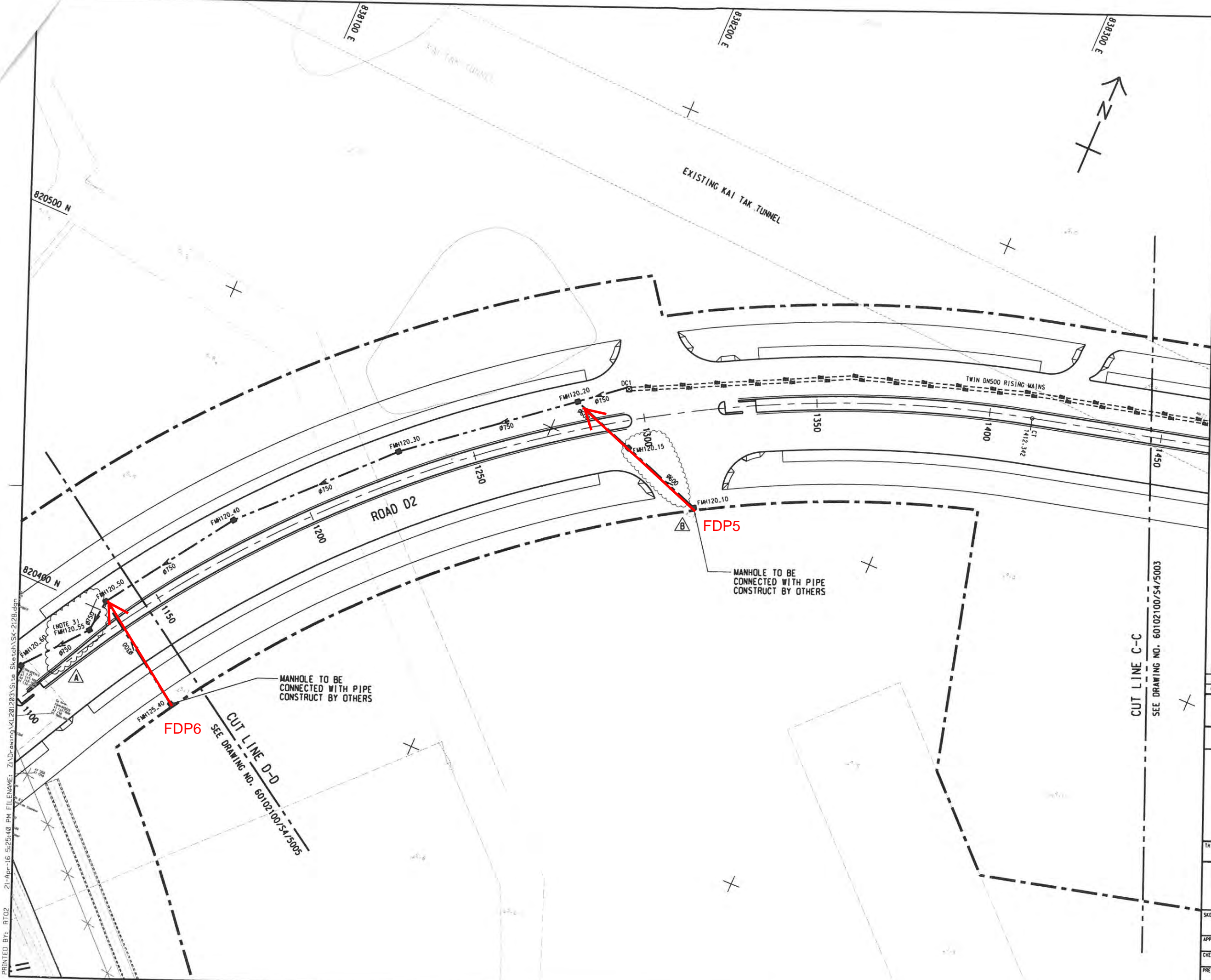
KAI TAK DEVELOPMENT
 KAI TAK DEVELOPMENT -
 STAGE 4 INFRASTRUCTURE AT
 FORMER NORTH APRON AREA

SEWERAGE - LAYOUT PLAN

THIS SITE SKETCH RELATED TO: 60102100/S4/5003

AECOM	
SKETCH NO. SK-291	REV. A
APPROVED BY S. CHENG	CONTRACT NO. KL/2012/03
CHECKED BY T. PANG	1ST ISSUE DATE 05/01/2015
PREPARED BY K. YIP	SCALE 1:1000@A3 1:500 @A1
DRAWN BY F. WONG	

PRINTED BY: RSTO 01-Mar-16 3:52:36 PM FILENAME: Z:\Drawing\KL201203\Site Sketch\sk-291a.dgn



- NOTES:**
1. FOR NOTES AND LEGEND, REFER TO DRAWING NO. 60102100/S4/5001.
 2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/S4/5001 TO 5003 AND 5005 TO 5008.
 3. LOCATION OF FMH120.55 TO BE DETERMINED ON SITE.

B	MINOR AMENDMENT	20APR16	TP	MR. LEUNG
A	MINOR AMENDMENT	24DEC15	TP	V. LEE
REV.	DESCRIPTION	DATE	CHKD.	APPROVED

CEDD 土木工程拓展署
 Civil Engineering and Development Department

KAI TAK DEVELOPMENT
 KAI TAK DEVELOPMENT - STAGE 4 INFRASTRUCTURE AT FORMER NORTH APRON AREA

SEWERAGE - LAYOUT PLAN

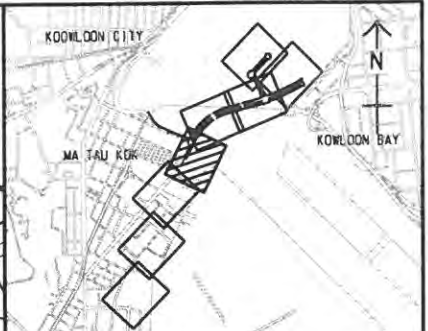
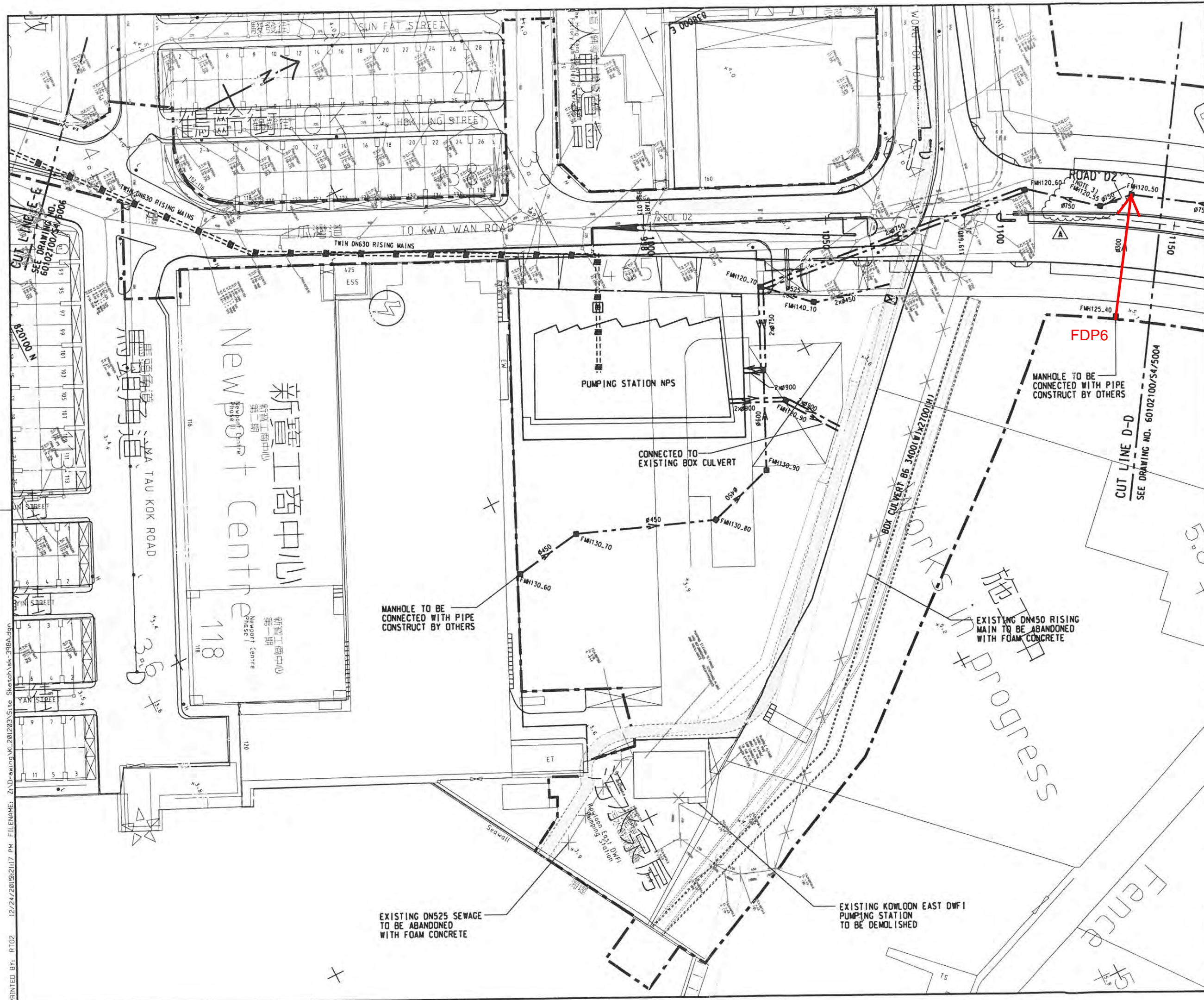
SHEET 4 OF 8
 THIS SITE SKETCH RELATED TO: 60102100/S4/5004



SKETCH NO.	SK-212	REV.	B
APPROVED BY	V. LEE	CONTRACT NO.	KL/2012/03
CHECKED BY	T. PANG	1ST ISSUE DATE	27/08/2014
PREPARED BY	K. YIP	SCALE	1:1000@A3 1:500@A1
DRAWN BY	F. WONG		

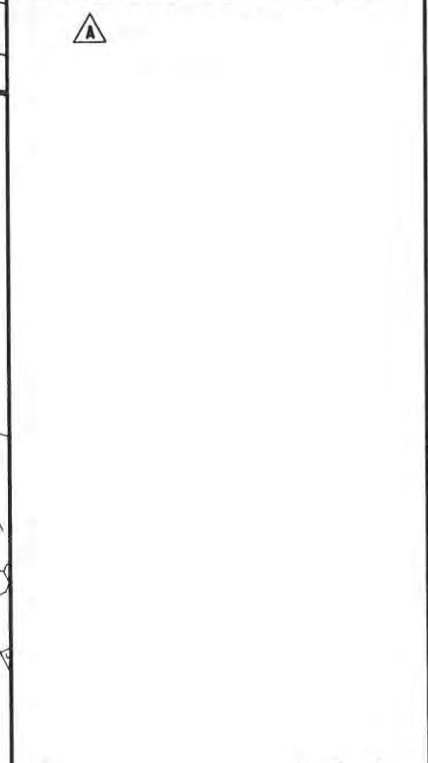
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100mm ON ORIGINAL



KEY PLAN
SCALE A1 1 : 25000
A3 1 : 50000

- NOTES:**
1. FOR NOTES AND LEGEND, REFER TO DRAWING NO. 60102100/S4/5001.
 2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/S4/5001 TO 5004 AND 5006 TO 5008.
 3. LOCATION OF FM120.55 TO BE DETERMINED ON SITE.



REV	DESCRIPTION	DATE	DRAWN	CHECKED	APPROVED
A	MINOR AMENDMENT	24DEC15	TP	V LEE	

CEDD 土木工程拓展署
Civil Engineering and Development Department

KAI TAK DEVELOPMENT
KAI TAK DEVELOPMENT - STAGE 4 INFRASTRUCTURE AT FORMER NORTH APRON AREA

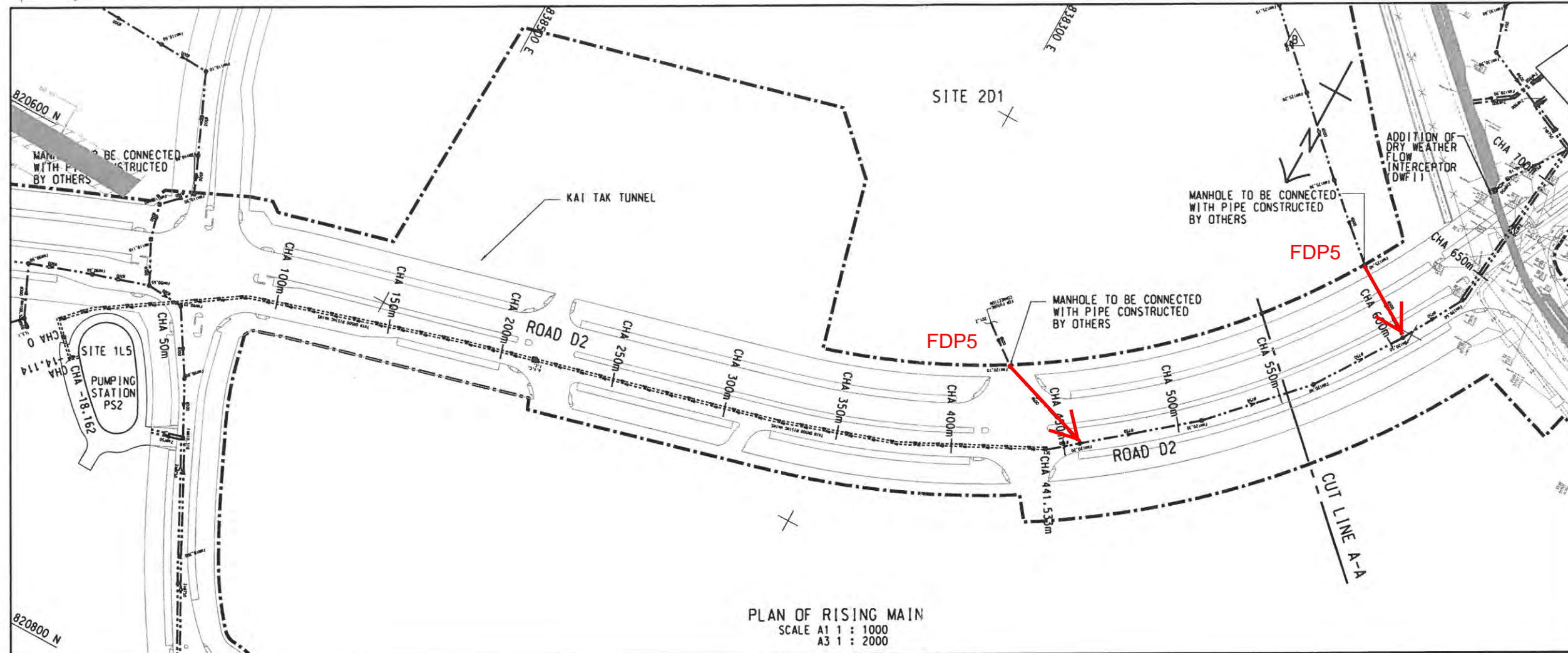
SEWERAGE - LAYOUT PLAN
SHEET 5 OF 8

THIS SITE SKETCH RELATED TO: 60102100/S4/5005

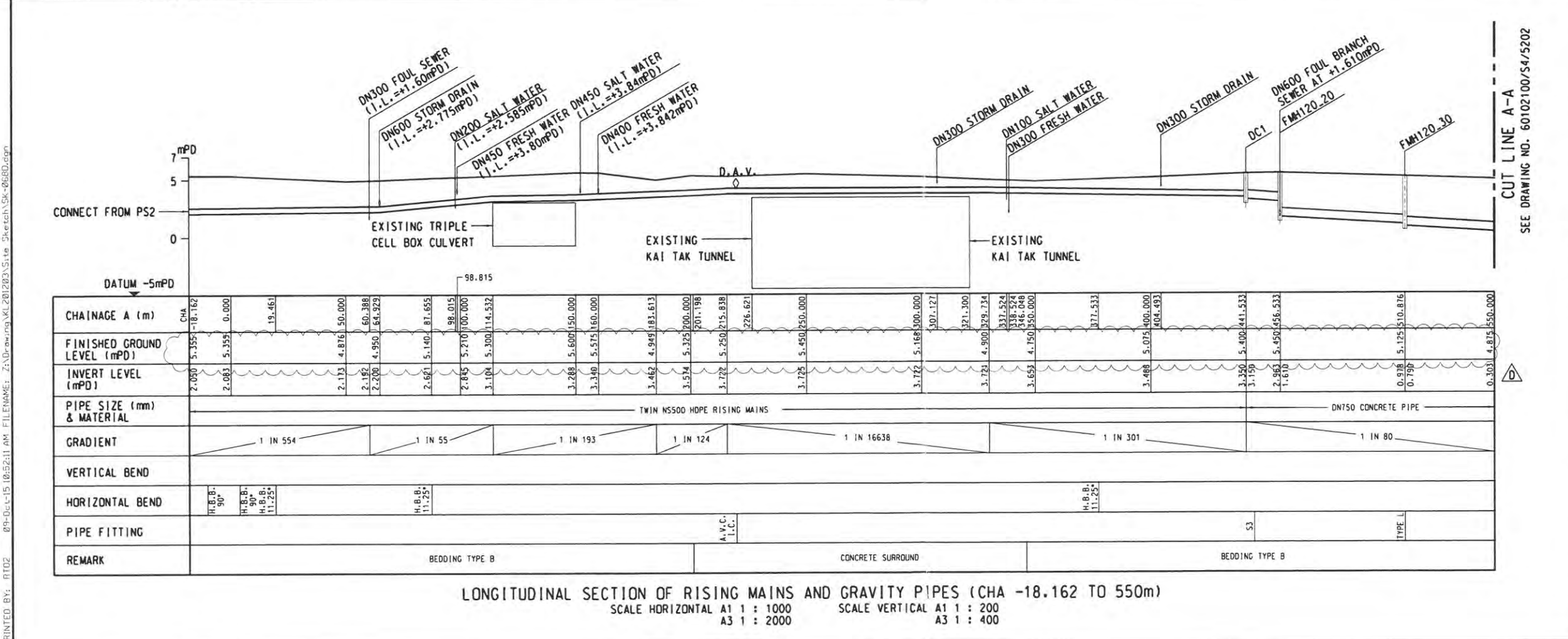
AECOM

SKETCH NO.	REV.
SK-398	A
APPROVED BY	CONTRACT NO.
V. LEE	KL/2012/03
CHECKED BY	1ST ISSUE DATE
T. PANG	02/09/2015
PREPARED BY	SCALE
K. YIP	1:1000@A3 1:500@A1
DRAWN BY	
F. WONG	

PRINTED BY: RT02 12/24/2015 02:17 PM FILENAME: Z:\D:\aung.kl.201203\Site Sketch\sk-398A.dgn



- NOTES:**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/S4/S202.
 - LOCATIONS AND INVERT LEVELS OF ALL EXISTING UTILITIES AND STRUCTURES SHOWN IN THIS DRAWING ARE APPROXIMATE AND FOR INFORMATION ONLY. THE EXACT LOCATIONS AND INVERT LEVELS OF ALL EXISTING UTILITIES AND STRUCTURES SHALL BE VERIFIED AND DETERMINED ON SITE BEFORE ANY COMMENCEMENT OF LAYING OF RISING MAINS.
- LEGEND:**
- SITE BOUNDARY
 - GRAVITY SEWER AND MANHOLE
 - RM --- RM --- SEWERAGE TWIN RISING MAINS
 - ☐ SEMI DISCHARGE CHAMBER (DC)
- ABBREVIATIONS:**
- I.C. INSPECTION CHAMBER
 - D.A.V. DOUBLE AIR VALVE
 - H.B.B. HORIZONTAL BEND THRUST BLOCK



LONGITUDINAL SECTION OF RISING MAINS AND GRAVITY PIPES (CHA -18.162 TO 550m)
 SCALE HORIZONTAL A1 1 : 1000 A3 1 : 2000
 SCALE VERTICAL A1 1 : 200 A3 1 : 400

REV	DESCRIPTION	DATE	DESIGN	APPROVED
D	MINOR REVISION	08DEC15	TP	S Cheng
C	MINOR REVISION	03MAY15	TP	S Cheng
B	MINOR REVISION	16SEP14	TP	S Cheng
A	MINOR REVISION	27AUG14	TP	S Cheng



KAI TAK DEVELOPMENT
 KAI TAK DEVELOPMENT - STAGE 4 INFRASTRUCTURE AT FORMER NORTH APRON AREA
SEWERAGE - NS500 TWIN RISING MAINS AND GRAVITY PIPES LONG PROFILE CHA
 SHEET 1 OF 2



THIS SITE SKETCH RELATED TO: 60102100/S4/S201

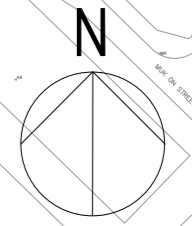
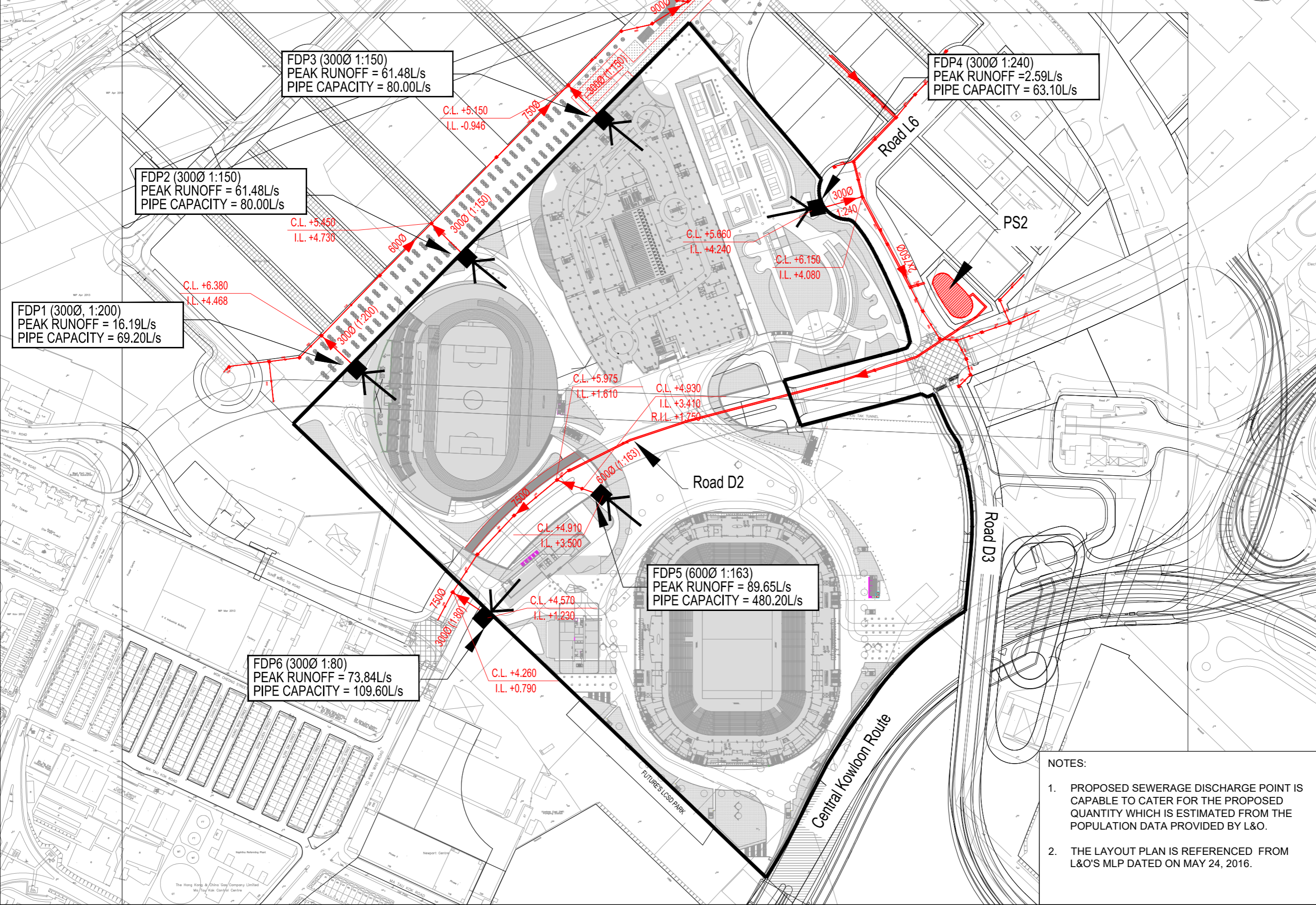


SKETCH NO.	SK-068	REV.	D
APPROVED BY	S. CHENG	CONTRACT NO.	KL/2012/03
CHECKED BY	T. PANG	1ST ISSUE DATE	14/05/2014
PREPARED BY	K. YIP	SCALE	AS SHOWN
DRAWN BY	F. WONG		

PRINTED BY: RT02 09-Dec-15 10:52:11 AM FILENAME: Z:\Drawing\K1201203\Site Sketch\SK-068D.dgn

LEGEND:

-  PROPOSED SEWERAGE DISCHARGE POINT
-  PROPOSED SEWERAGE NETWORK FROM CEDD CONSTRUCTION DRAWINGS



Scale: 1:1250 (A0)
Drawing No.: CV000/SW001
Drawing Stage: Work Stage 1

- Reference Drawings:**
- 1. DO NOT SCALE DRAWING. ALL DIMENSIONS SHOULD BE CHECKED ON SITE.
 - 2. THE OWNERSHIP OF THE COPYRIGHT IN THIS DRAWING BELONGS TO THE ISSUER. NO REPRODUCTION OF THE DRAWING OR ANY PART THEREOF CAN BE MADE.
- Consultants:**
- HOME AFFAIRS BUREAU
The Government of Hong Kong Special Administrative Region
 - LEIGH & ORANGE LTD.
1 852 2889 9000
1 852 2886 0343
info@leigo.com
 - JACKSON ARCHITECTURE
 - WSP | PARSONS BRINCKERHOFF
 - WSP | PARSONS BRINCKERHOFF
 - WSP | PARSONS BRINCKERHOFF
 - WSP | PARSONS BRINCKERHOFF
 - SM&W
 - Webb
 - BMT Asia Pacific

- NOTES:**
- PROPOSED SEWERAGE DISCHARGE POINT IS CAPABLE TO CATER FOR THE PROPOSED QUANTITY WHICH IS ESTIMATED FROM THE POPULATION DATA PROVIDED BY L&O.
 - THE LAYOUT PLAN IS REFERENCED FROM L&O'S MLP DATED ON MAY 24, 2016.

Project:	Consultancy Agreement No. 90D 113
Supplementary Information:	Dated 08/07/2016
Drawn By:	Drawn By:
Date:	04/07/2016
Approved:	Approved:
Scale:	1:1250 (A0)
Drawing No.:	CV000/SW001
Sheet No.:	15112
Sheet Title:	Work Stage 1
Sheet Size:	A0

Appendix 7.4

**Email from CEDD/Consultant Confirming
Roughness of Coefficients (Ks)**

From: Choy, Tat Cheong Charles [<mailto:charles.choy@aecom.com>]
Sent: Wednesday, May 25, 2016 11:21 PM
To: Amber <amberwang@mlal.com.hk>
Cc: edmundchan@cedd.gov.hk; skng@cedd.gov.hk; moonshingman@hab.gov.hk; lamwkv@archsd.gov.hk; laur@archsd.gov.hk; Ho, Wai Luek Igor <igor.ho@aecom.com>; Au Yeung, Ho Shun Vincent <vincent.auyeung@aecom.com>; Tan, Sunny E. <sunny.tan@aecom.com>; mwlee@mlal.com.hk; rubywang@mlal.com.hk; 'MLAL' <office@mlal.com.hk>; 'Ks Lee' <ks.lee@cinotech.com.hk>
Subject: RE: SEWERAGE AND SEWAGE TREATMENT IMPLICATION for Kai Tak Multi-purpose Sports Complex - Draft Environmental Impact Assessment (EIA) Report

Dear Amber,

Please find our responses as follows:

1. Roughness coefficients (Ks) to be adopted for different pipes and conditions are as follows:
Ks = 0.6mm for vitrified clay pipes; Ks = 1.5mm for precast concrete pipes.

The layout and the gradient of the concerned pipes are attached for your reference. Please be noted that the pipes are under construction under CEDD Contract No. KL/2012/03 and they are still subject to change before the completion of the construction.

Siltation is not considered during our design of the sewers.

2. Please be confirmed that the infrastructure provisions by CEDD are able to cater for the updated sewage estimation of MPSC. However, we would be grateful if you could provide the breakdown of the updated sewage estimation of MPSC (i.e. sewage generations from Main Stadium, Public Sports Ground, Indoor Sports Centre, Hotel, Office and Retail Areas respectively) for our reference.

Thank you.

Regards,

Charles Choy
Water & Urban Development, Hong Kong
D +852-3922-9105
charles.choy@aecom.com

AECOM
13/F Grand Central Plaza, Tower 2
138 Shatin Rural Committee Road, Shatin
Hong Kong
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From: skng@cedd.gov.hk [<mailto:skng@cedd.gov.hk>]
Sent: 25 May 2016 16:18
To: Choy, Tat Cheong Charles <charles.choy@aecom.com>
Cc: edmundchan@cedd.gov.hk; Ho, Wai Luek Igor <igor.ho@aecom.com>; 'Ks Lee' <ks.lee@cinotech.com.hk>; lamwkv@archsd.gov.hk; laur@archsd.gov.hk; moonshingman@hab.gov.hk; mwlee@mlal.com.hk; 'MLAL' <office@mlal.com.hk>; rubywang@mlal.com.hk; skng@cedd.gov.hk; Au Yeung, Ho Shun Vincent <vincent.auyeung@aecom.com>; Amber <amberwang@mlal.com.hk>
Subject: RE: SEWERAGE AND SEWAGE TREATMENT IMPLICATION for Kai Tak Multi-purpose Sports Complex - Draft Environmental Impact Assessment (EIA) Report

Dear Charles,

Please provide your response by COP today.

Regards,

SK NG
 E/19, KDevO
 Tel: 3104 2498

From: "Amber" <amberwang@mlal.com.hk>
 To: "'Choy, Tat Cheong Charles'" <charles.choy@aecom.com>,
 Cc: <edmundchan@cedd.gov.hk>, "'Ks Lee'" <ks.lee@cinotech.com.hk>, <lamwkv@archsd.gov.hk>, <laur@archsd.gov.hk>, <moonshingman@hab.gov.hk>, <mwlee@mlal.com.hk>, "'MLAL'" <office@mlal.com.hk>, <rubywang@mlal.com.hk>, "'Au Yeung, Ho Shun Vincent'" <vincent.auyeung@aecom.com>, "'Ho, Wai Luek Igor'" <igor.ho@aecom.com>, <skng@cedd.gov.hk>
 Date: 24/05/2016 16:17
 Subject: RE: SEWERAGE AND SEWAGE TREATMENT IMPLICATION for Kai Tak Multi-purpose Sports Complex - Draft Environmental Impact Assessment (EIA) Report
 EDMS No.: Doc. Src. :

Dear Charles,

We like to seek advice from CEDD on the following comment from DSD for EIA for Kai Tak Multi-purpose Sports Complex - Draft Environmental Impact Assessment (EIA) Report - Chapter 7 SEWERAGE AND SEWAGE TREATMENT IMPLICATION:

1. "Siltation, gradient of pipes and appropriate pipe roughness should be considered in checking the capacity of sewers." – The siltation, gradient of pipes and appropriate pipe roughness are not found in the Infrastructure Review Report of Kai Tak Development prepared

by CEDD (IRR). The concerned pipes are highlighted by red cloud in attachment. Please advise.

2. “The estimated sewage flow generated from MPSC has exceeded the value in the IRR. The estimated average dry weather flow (DWF) of 4,026 m³/day or 0.047 m³/sec is comparable with the flow of 0.083 m³/sec reported in Table 4.18 Projected Peak flow for Year 2031 and Ultimate Scenario in the Infrastructure Review Report (Final) Rev 1 (IRR). (noting that the total flow is still within the design capacity of the sewerage system en route to Stonecutters Island Sewage Treatment Works.) The project proponent should seek confirmation with CEDD that the infrastructure provisions by CEDD would cater for the updated sewage estimation of MPSC.” – Please confirm.

Please feel free to contact us if you have any queries.

Regards,
Amber

李榮護建築工程師事務所有限公司
Maurice Lee & Associates Ltd.
Civil, Environmental, Geotechnical and Structural Engineers and Architects
8/F Hang Seng NP Building, 341 King's Road, North Point, Hong Kong
Tel (852) 2510 8611
Fax (852) 2510 0189

From: skng@cedd.gov.hk [<mailto:skng@cedd.gov.hk>]

Sent: Thursday, May 19, 2016 4:21 PM

To: Choy, Tat Cheong Charles <charles.choy@aecom.com>

Cc: edmundchan@cedd.gov.hk; 'Ks Lee' <ks.lee@cinotech.com.hk>; lamwkv@archsd.gov.hk; laur@archsd.gov.hk; moonshingman@hab.gov.hk; mwlee@mlal.com.hk; 'MLAL' <office@mlal.com.hk>; rubywang@mlal.com.hk; 'Au Yeung, Ho Shun Vincent' <vincent.auyeung@aecom.com>; Amber <amberwang@mlal.com.hk>; Ho, Wai Luek Igor <igor.ho@aecom.com>

Subject: RE: SEWERAGE AND SEWAGE TREATMENT IMPLICATION for Kai Tak Multi-purpose Sports Complex - Draft Environmental Impact Assessment (EIA) Report

Dear Charles,

Would you please note the email below and clarify the two queries regarding the infrastructures under our IRR.

Thanks.

Regards,

SK NG
E/19, KDevO
Tel: 3104 2498

From: "Amber" <amberwang@mlal.com.hk>
To: "'Au Yeung, Ho Shun Vincent'" <vincent.auyeung@aecom.com>,
Cc: <skng@cedd.gov.hk>, "'MLAL'" <office@mlal.com.hk>, <moonshingman@hab.gov.hk>, <laur@archsd.gov.hk>, <lamwkv@archsd.gov.hk>, "'Ks Lee'" <ks.lee@cinotech.com.hk>, <mwlee@mlal.com.hk>, <rubywang@mlal.com.hk>, <edmundchan@cedd.gov.hk>
Date: 17/05/2016 09:57
Subject: RE: SEWERAGE AND SEWAGE TREATMENT IMPLICATION for Kai Tak Multi-purpose Sports Complex - Draft Environmental Impact Assessment (EIA) Report
EDMS No.: Doc. Src. :

Dear Mr. Vincent,

Attached pls find the location drawing.

Regards,

Amber

From: Amber [<mailto:amberwang@mlal.com.hk>]

Sent: Tuesday, May 17, 2016 9:55 AM

To: 'Au Yeung, Ho Shun Vincent' <vincent.auyeung@aecom.com>

Cc: 'skng@cedd.gov.hk' <skng@cedd.gov.hk>; 'MLAL' <office@mlal.com.hk>; 'moonshingman@hab.gov.hk' <moonshingman@hab.gov.hk>; 'laur@archsd.gov.hk' <laur@archsd.gov.hk>; 'lamwkv@archsd.gov.hk' <lamwkv@archsd.gov.hk>; 'Ks Lee' <ks.lee@cinotech.com.hk>; 'mwlee@mlal.com.hk' <mwlee@mlal.com.hk>; 'rubywang@mlal.com.hk' <rubywang@mlal.com.hk>; 'edmundchan@cedd.gov.hk' <edmundchan@cedd.gov.hk>

Subject: RE: SEWERAGE AND SEWAGE TREATMENT IMPLICATION for Kai Tak Multi-purpose Sports Complex - Draft Environmental Impact Assessment (EIA) Report

Dear Mr. Vincent,

We like to seek advice from CEDD on the following comment from DSD for EIA for Kai Tak Multi-purpose Sports Complex - Draft Environmental Impact Assessment (EIA) Report - Chapter 7 SEWERAGE AND SEWAGE TREATMENT IMPLICATION:

1. "Siltation, gradient of pipes and appropriate pipe roughness should be considered in checking the capacity of sewers." – The siltation, gradient of pipes and appropriate pipe roughness are not found in the Infrastructure Review Report of Kai Tak Development prepared by CEDD (IRR). The concerned pipes are highlighted by red cloud in attachment. Please advise.
2. "The estimated sewage flow generated from MPSC has exceeded the value in the IRR. The estimated average dry weather flow (DWF) of 4,026 m³/day or 0.047 m³/sec is comparable with the flow of 0.083 m³/sec reported in Table 4.18 Projected Peak flow for Year 2031 and Ultimate Scenario in the Infrastructure Review Report (Final) Rev 1 (IRR). (noting that the total flow is still within the design capacity of the sewerage system en route to Stonecutters Island Sewage Treatment Works.) The project proponent should seek confirmation with CEDD that the infrastructure provisions by CEDD would cater for the updated sewage estimation of MPSC." – Please confirm.

Please feel free to contact us if you have any queries.

Regards,
Amber

李榮護建築工程師事務所有限公司
Maurice Lee & Associates Ltd.
Civil, Environmental, Geotechnical and Structural Engineers and Architects
8/F Hang Seng NP Building, 341 King's Road, North Point, Hong Kong
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Fax (852) 2510 0189

Appendix 8A

**Practice Note for Registered Contractors
No. 17**

Control of Environmental Nuisance from Construction Sites

Construction sites if not properly managed may become the source of serious environmental nuisance and related pollution affecting not only the workers on site but also adjoining occupants and the general public. Registered contractors are therefore strongly urged to take appropriate steps to minimize the impact of construction activities on the surrounding environment.

2. Appendix A is a checklist to assist in identifying possible nuisance and providing effective remedies. Further guidance if required, may be sought from the relevant Government departments listed.
3. A similar practice note has been issued to authorized persons and registered structural engineers.

(CHOI Yu-leuk)
Building Authority

Ref. : BD GR/ACT/11

First issued June 1991

This revision August 1997 (AD/D)

Index : Control of Environmental Nuisance from Construction Sites
Construction Sites, Control of Environmental Nuisance
Environmental Nuisance from Construction Sites
Nuisance, Environmental
Pollution, Environmental

Checklist and Practical Advice for the Control of
Environmental Nuisance from Construction Sites

Common Environmental Nuisance	Practical Advice to Minimize/Prevent Nuisance (where appropriate)	Legislative Sanctions (where applicable)	Responsible Government Department(s) and Point of Contact
Noise			
<p>(1) Excessive noise from use of powered mechanical equipment.</p> <p>(2) Excessive noise from erection or dismantling of formwork or scaffolding, rubble disposal, steel bars handling and hammering works.</p>	<ol style="list-style-type: none"> 1. Planning <ul style="list-style-type: none"> - use quiet alternative construction method where possible (e.g. non-percussive piling vs percussive piling). - use quiet powered mechanical equipment. 2. Adopt noise abatement measures <ul style="list-style-type: none"> - provide baffle/noise screens to noisy machines as necessary. - provide sound absorptive linings to the interior of engine compartments. 3. Improve operating / maintenance procedures. <ul style="list-style-type: none"> - locate noise source away from sensitive user. - operate machine only when necessary. - maintain machine properly (fasten loose panels, replace defective silencers). - reduce impact noise by careful handling. 4. Time scheduling <p>minimize noise disturbance by careful scheduling of noisy activities to less sensitive hours.</p> 5. Education <ul style="list-style-type: none"> - educate and encourage all workers and foremen to be more noise conscientious. 	<p>A permit is required for carrying out percussive piling operation. Use of powered mechanical equipment (between 7 p.m. and 7 a.m. on a weekday or all day on Sundays and Public Holidays) or the carrying out of prescribed construction work (per item (2) of column one) in designated areas (predominantly built-up areas) also requires a permit.</p> <p>Carrying out the above work without valid construction noise permits or not adhering to permit conditions is actionable under the Noise Control Ordinance. Maximum fine is \$100,000 upon conviction, \$200,000 upon subsequent conviction.</p>	<p>Environmental Protection Department (EPD) Pollution Complaints Hotlines at Local Control Offices</p>

Common Environmental Nuisance	Practical Advice to Minimize/Prevent Nuisance (where appropriate)	Legislative Sanctions (where applicable)	Responsible Government Department(s) and Point of Contact
Air			
(3) Black smoke/fume from construction equipment such as diesel hammer.	1. Planning - use properly maintained or less air-polluting equipment.	Emission of excessive smoke/dust from any plant in a construction site is actionable under the Air Pollution Control Ordinance. Maximum fine is \$500,000 and imprisonment for 12 months upon conviction.	EPD, Local Control Offices, Air Control Section
(4) Dust nuisance from demolition, operation of vehicles, material handling, conveyor system and concrete batching.	2. Material storage & conveying - cover dust generating material. - provide water sprays to dampen dust generating material during transportation/storage.	Carrying out the following construction work without notifying the Environmental Protection Department beforehand is actionable under the Air Pollution Control (Construction Dust) Regulation :	EPD, Local Control Offices, Air Control Section
(5) Dust, odour and smoke nuisance from open burning of refuse in construction site.	3. Main Haul Road - provide hard paving on main haul road. - spray main haul road with water. 4. Vehicles - cover material properly during transportation. - control vehicle speeds on site. - wash vehicle wheels before leaving site. 5. Fugitive dust from site - water site area frequently. - erect hoarding around site boundary. 6. Concrete batching - locate such activities away from sensitive user. - incorporate proper dust suppression measures.	- site formation; - reclamation; - demolition of a building; - tunnel work excluding any part beyond 100 metres from the exit to the open air; - construction of the foundation of a building; - construction of the superstructure of a building; - road construction work. Maximum fine is \$25,000 for the 1st conviction, and \$50,000 for 2nd and subsequent conviction. Without adopting appropriate dust reduction measures is actionable under the Air Pollution Control (Construction Dust) Regulation. Maximum fine is \$50,000 for 1st conviction and \$100,000 and 3-month imprisonment for 2nd and subsequent conviction.	Urban Services Department (USD) or Regional Services Department (RSD) as appropriate, District Office (Environmental Hygiene) concerned.
		In respect of demolition works failure to erect fans, catch platforms and dust screens as may be necessary to prevent any nuisance from dust or danger from debris or materials is actionable under the Building (Demolition Works) Regulations. Maximum fine is \$100,000 and imprisonment for 2 years upon conviction.	Buildings Department (BD). (Report to Area Building Surveyor).

Common Environmental Nuisance	Practical Advice to Minimize/Prevent Nuisance (where appropriate)	Legislative Sanctions (where applicable)	Responsible Government Department(s) and Point of Contact
		<p>Deposit of litter (including dirt, soil or dust) from vehicles onto street is actionable under the Public Cleansing & Prevention of Nuisances By-laws. Maximum fine is \$25,000 (level 4) and imprisonment for 6 months upon conviction.</p> <p>Open burning of refuse in construction sites is banned under the Air Pollution Control (Open Burning) Regulation. Maximum fine is \$50,000 plus \$500 for every 15 minutes for which the offence continues for 1st conviction. For any subsequent conviction, maximum fine is \$50,000 and 3-month imprisonment, plus \$500 for every 15 minutes for which the offence continues.</p>	<p>USD or RSD as appropriate.</p> <p>EPD, Local Control Offices, Air Control Section</p>
<p>Water</p>			
<p>(6) Blockage of sewers / drains by silt/cement mortar/concrete.</p>	<p>1. Planning</p> <ul style="list-style-type: none"> - incorporate temporary drainage system with de-silting facility before connecting directly to the main drainage system. 	<p>Discharge of muddy water etc. from a construction site is actionable under the Public Health and Municipal Services Ordinance. Maximum fine is \$5,000 upon conviction.</p>	<p>Drainage Services Department (DSD) relevant Operations and Maintenance Division (CE/HK & Islands, CE/Mainland South or CE/Mainland North as appropriate) or BD</p>
<p>(7) Discharge of waste water from sites, flooding etc.</p>	<ul style="list-style-type: none"> - install sand trap, settling pit or grease trap as necessary. 		
<p>(8) Accumulated waste water causing hygiene problems.</p>	<ul style="list-style-type: none"> - install perimeter drainage channels or place sand bags along the low end of boundary. - install pH adjustment facilities or petrol interceptor as necessary. - cover open site area with gravel. - locate vehicle and plant servicing areas, vehicle wash bays and lubrication bays within roofed areas as far as possible. - provide vehicle washdown facilities on site. 	<p>Construction site discharges are controlled under Water Pollution Control Ordinance (WPCO) and must comply with the terms and conditions of a valid WPCO licence. Discharge of any waste or polluting matter into Water Control Zone is an offence under the WPCO. Maximum penalty is \$200,000 and imprisonment of 6 months for the first offence.</p>	<p>EPD</p>
	<p>2. Site maintenance</p> <ul style="list-style-type: none"> - clear trapped debris and sediments frequently. - maintain sanitary condition at effluent disposal point. 		

Common Environmental Nuisance	Practical Advice to Minimize/Prevent Nuisance (where appropriate)	Legislative Sanctions (where applicable)	Responsible Government Department(s) and Point of Contact
	<ul style="list-style-type: none"> - pump and properly drain away all stagnant water. - cover open stockpiles of construction materials and temporarily exposed slope by tarpaulin or similar fabric, especially during rainy season. 3. Water conservation - reuse water from de-silting facility for other purposes such as truck wheel washing. 		
Health			
(9) Mosquito breeding	<ul style="list-style-type: none"> (a) To pump and properly drain away all stagnant water. (b) To spray once weekly a thin layer of diesel oil on the water surface if it is not possible to pump or drain the stagnant water away. (c) To cover all water containers with close fitting lids. (d) To level all undulating ground surface. (e) To remove and properly dispose of all worn out rubber tires, empty cans and bottles and all other articles capable of retaining water from the site. 	Any accumulation of water on any premises found to contain mosquito larvae or pupae is actionable under the Public Health and Municipal Services Ordinance. Maximum penalty is \$25,000 (level 4) upon conviction and a daily fine of \$450.	USD or RSD as appropriate.
(10) Fly breeding	<ul style="list-style-type: none"> (a) To protect open food with fly-proof containers. (b) To store food remnants and refuse pending removal in properly covered containers. (c) To remove and properly dispose of food remnants and refuse daily. (d) To provide proper latrine accommodations and to properly dispose of human excrete daily. 	Any accumulation of refuse which is a nuisance or injurious to health is actionable under the Public Health and Municipal Services Ordinance. Maximum penalty is \$10,000 (level 3) upon conviction and a daily fine of \$200.	USD or RSD as appropriate.
(11) Rodent infestation	<ul style="list-style-type: none"> (a) To store both raw and cooked foods in properly covered containers. (b) To store food remnants and refuse pending removal in properly covered containers. (c) To remove and dispose of food remnants daily. (d) To seal up all holes in unpaved ground. (e) To clear and properly dispose of junk and building debris regularly. 	Any premises in such a state as to be a nuisance or injurious to health is actionable under the Public Health and Municipal Services Ordinance. Maximum penalty is \$10,000 (level 3) upon conviction and a daily fine of \$200.	USD or RSD as appropriate.

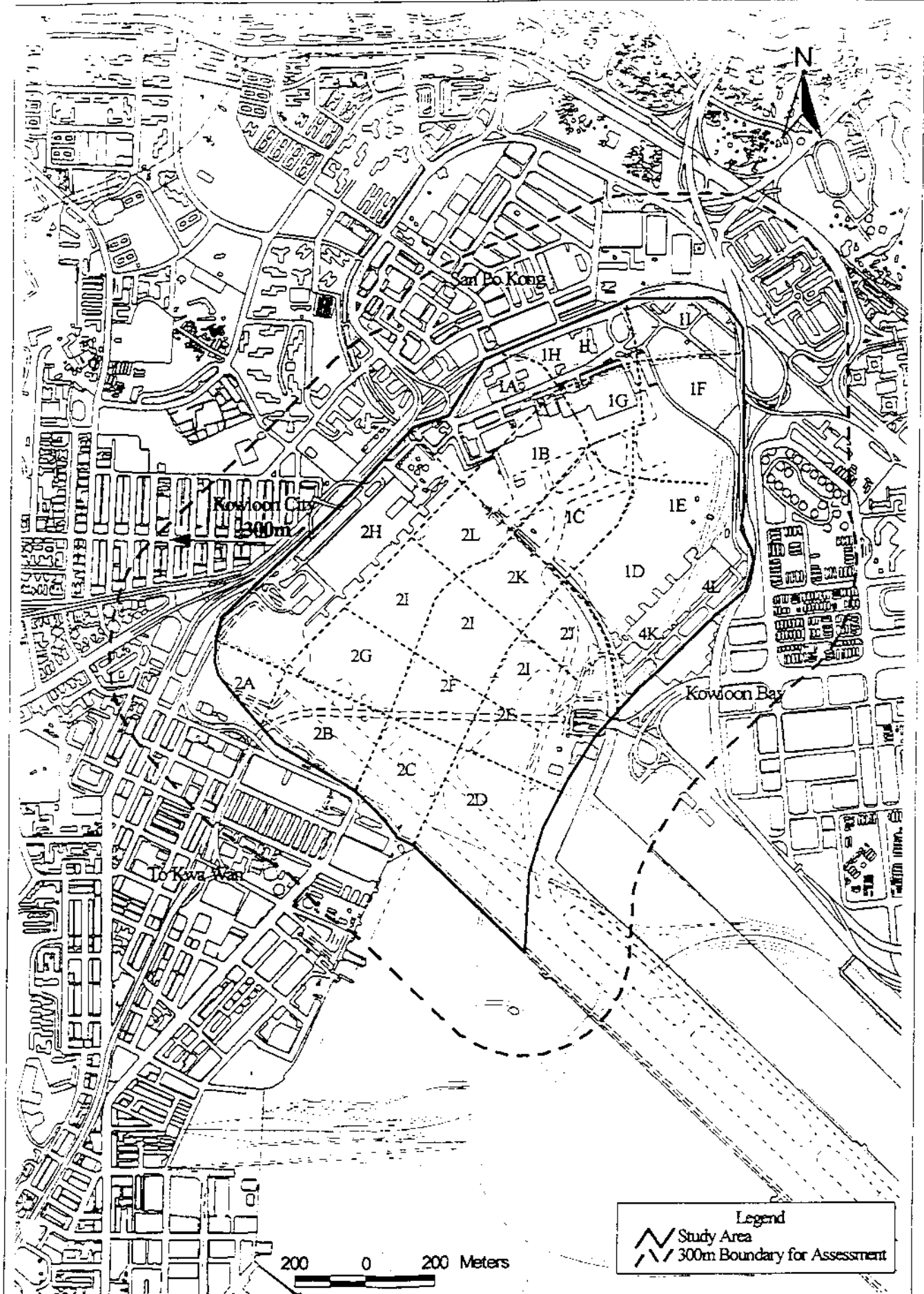
Common Environmental Nuisance	Practical Advice to Minimize/Prevent Nuisance (where appropriate)	Legislative Sanctions (where applicable)	Responsible Government Department(s) and Point of Contact
(12) Accumulation of refuse	<p>(a) To store refuse pending removal in receptacles provided with close fitting covers.</p> <p>(b) To remove and properly dispose of refuse daily.</p>	Any accumulation of refuse which is a nuisance or injurious to health is actionable under the Public Health and Municipal Services Ordinance. Maximum penalty is \$10,000 (level 3) upon conviction and a daily fine of \$200.	USD or RSD as appropriate
(13) Connection of temporary toilet facilities to stormwater drains or water courses causing pollution	Connect to proper sewers or in unsewered area, connect to a septic tank and soakaway system or a sewage treatment plant for large flows. The same principle is applied to discharge from kitchens.	Discharge of any waste or polluting matter into stormwater drains or water courses is an offence under the Water Pollution Control Ordinance. Maximum penalty is a fine of \$200,000 and imprisonment for 6 months for the first offence.	DSD, EPD or BD
Associated with Drains (other than included elsewhere)			
(14) Blockage of public drains by entry of silty materials through old and/or abandoned sewer and drainage connections.	Seal up sewer and drainage connections before commencing demolition or foundation works.	In respect of demolition works failure to seal all sewer and drainage connections is actionable under the Building (Demolition Works) Regulations. Maximum fine is \$100,000 and imprisonment for 2 years upon conviction.	BD
		Entry of foreign matter into the public drainage system is actionable under the Public Health and Municipal Services Ordinance.	DSD
(15) Damage to drains and sewers by construction of foundations	Construction operations to be closely monitored to avoid possible damage to drains and sewers.		DSD or BD
(16) Blockage of access to public manholes within sites and/or drainage reserves by temporary structures	Temporary structures such as contractors' sheds to be properly sited.		DSD or BD
(17) Damage to public stormwater drains or foul sewers within or adjoining sites not promptly reported to DSD.	Construction operations to be closely monitored to avoid possible damage to drains and sewers		DSD or BD
(18) Surface water drainage from construction sites discharging through illicit connections into foul sewers, and contributing to exceptionally high flood flows at sewage treatment works.	This practice causes treatment and pollution problems and is unacceptable. Ensure surface water is directed to sand/silt removal facilities before discharging into natural drainage channels or to surface water drains.		DSD or BD



Common Environmental Nuisance	Practical Advice to Minimize/Prevent Nuisance (where appropriate)	Legislative Sanctions (where applicable)	Responsible Government Department(s) and Point of Contact
Associated with roads/ footpaths			
(19) Dropping of materials on roads	(a) To properly secure and cover all loads on the vehicles before leaving the site.	Deposit of litter (including dirt, soil or dust) from vehicles onto street is actionable under Public Cleansing and Prevention of Nuisances By-laws. Maximum fine is \$25,000 (level 4) and imprisonment for 6 months upon conviction.	USD or RSD as appropriate, or Hong Kong Police Force (HKPF)
(20) Mud on roads	(a) To provide water bath for washing the wheels of vehicles before leaving the site. (b) To provide workers at the exit of the site to flush the body of each vehicle before leaving the site and to clear any mud that it carries onto the road.	Carrying of mud by vehicle onto street is actionable under Public Prevention of Nuisances By-laws. Maximum fine is \$25,000 and imprisonment for 6 months upon conviction.	USD or RSD as appropriate, or HKPF
(21) Excavation works in progress (utility trenches etc.)		May be actionable under Summary Offences Ordinance	Highways Department (HyD) or direct to Utility Company in the first instance if excavation made by them.
(a) Undue inconvenience to the public e.g. inadequate footpath width, obstruction due to stacked material or contractor's equipment	(a) To maintain minimum footpath width for the pedestrian demand. (b) To supervise the works regularly		TD
(b) Hazard to the public e.g. insufficient guarding and lighting, loose excavated material, pedestrians forced to walk on carriageway	(a) To provide in accordance with Code of Practice for the Lighting, Signing and Guarding of Road Works.		HyD
(c) Trench back-filled but not properly surfaced and no work was carried out			HyD
(22) The run-in for construction/ demolition vehicles presenting a hazard to pedestrians	(a) To separate pedestrian and construction vehicles. (b) Temporary resiting/removal of traffic signs should be agreed by TD.		BD in the first instance, or Transport Department (TD)
(23) Traffic signs in footpath damaged or obscured by hoardings	(a) To ensure that hoardings will not affect the existing signs. (b) To ensure that the general conditions for hoarding plans shall be observed.		HyD (if signs damaged) or TD (if signs obstructed) or BD

Common Environmental Nuisance	Practical Advice to Minimize/Prevent Nuisance (where appropriate)	Legislative Sanctions (where applicable)	Responsible Government Department(s) and Point of Contact
(24) Footpath damaged and not temporarily re-surfaced			HyD or BD
(25) Footpath hazardous to pedestrians due to contractor's operations, past or present			HyD or BD
(26) Footpaths not cleared of litter and rubbish		May be actionable under Public Health and Municipal Services Ordinance or Summary Offences Ordinance according to circumstances.	USD/RSD or HyD according to circumstance.
(27) Dumping on the footpath e.g. debris, loose soil or rock building materials		May be actionable under Public Health and Municipal Services Ordinance or Summary Offences Ordinance according to circumstances.	USD/RSD or HyD according to circumstance.
(28) Vehicles parked on the footpath			HKPF
(29) Objects dropped from buildings	Provide fans, catch platforms and/or mesh screens	Actionable under the Summary Offences Ordinance. Maximum fine is \$50,000 and imprisonment for 1 year upon conviction.	HKPF
Associated with hoardings/covered walkways (Refer also to PNAP:75)			
(30) Fabric of the hoarding apparently unsound and damaged		Actionable under the Building (Planning) Regulations	BD
(31) Hoarding not of minimum width stipulated in permit			BD
(32) Passage for pedestrians within the hoarding obstructed		May be actionable under the Summary Offences Ordinance	HKPF or BD
(33) Hoarding presenting a hazard to pedestrians			BD

Appendix 9A

**Study Area of Kai Tak Airport North
Apron Decommissioning EIA**



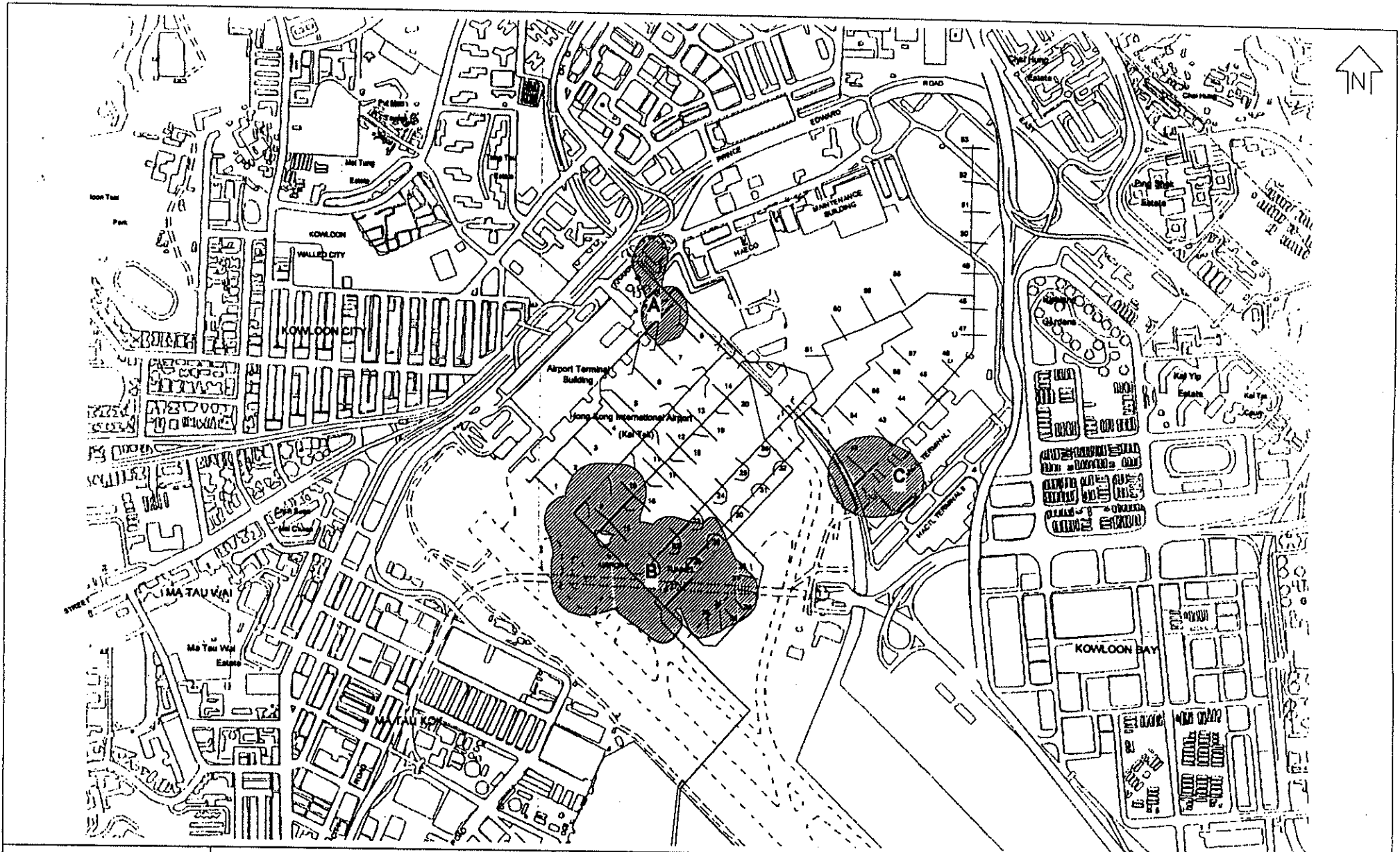
Legend
 Study Area
 300m Boundary for Assessment

200 0 200 Meters

Maunsell 環 C 境 E 科 G	KAI TAK AIRPORT NORTH APRON DECOMMISSIONING		Territory Development Department, Hong Kong Kowloon Development Office	
	TITLE Study Area	SCALE 1:15000	DATE March 1998	DRAWN Fanny Lau
	CAD REF C415		DRAWING NO. Figure 1.1	

Appendix 9B

**Remediation Areas of Kai Tak Airport
North Apron Decommissioning EIA**



<p>Maunsell</p> <p>環境科學</p>	<p>KAI TAK AIRPORT NORTH APRON DECOMMISSIONING</p>		<p>Tertiary Development Department/Hong Kong Keyplan Development Office</p>	
	<p>TITLE Remediation Areas : Overall Remediation Area</p>		<p>SCALE 1 : 13000</p>	<p>DATE March 1998</p>
		<p>DESIGNED Fanny Lau</p>	<p>DRAWN Fanny Lau</p>	
		<p>CAD REF. C415exe_sum</p>	<p>DRAWING NO. Figure 7.1</p>	<p>REV 0</p>

Appendix 9C

**Concrete Batching Plant, APP-120,
Practice Note for Authorized Persons and
Registered Structural Engineers, Buildings
Department**

Concrete Batching Plant

Background

Concrete Batching Plants (CBP) were originally located within construction sites for supply of concrete for on-site construction activities. Such CBP were commonly considered to be machinery and equipment and did not in the circumstances fall into the definition of 'building' under the Buildings Ordinance (BO). Over time, some CBP have evolved to become bigger, and others sited in urban areas, near buildings and public thoroughfares.

2. From time to time, Authorized Persons (AP) and Registered Structural Engineers (RSE) exercise their professional judgment in determining whether to submit plans of CBPs to the Building Authority (BA) for approval. Buildings Department (BD) also advises, in response to specific enquiries, on the need for submission of plans for approval.

Building Works

3. What constitutes a building and therefore becomes subject to the application of the BO is a question of degree and circumstances, including any risk they may pose to public safety. The BA is of the view that CBP fixed to and founded on the ground, connected to a utility supply and with a control room, are buildings under the BO. Hence approval and consent are required prior to their erection.

Requirements

4. Taking into account the growing concern on the public safety posed by contemporary CBP¹, the BA takes the following position on CBP: -

New CBP

- (a) For new CBP including associated structures such as cement, sand and aggregate handling facilities, building plans prepared by AP and RSE should be submitted to the BA for approval in accordance with the BO and regulations (including compliance with the town plan) before they are erected. For the common type of CBP shown on Appendix A, BA is prepared to process applications for approval and consent simultaneously upon request and such applications will be dealt with as outlined in Appendix B;

/(b)

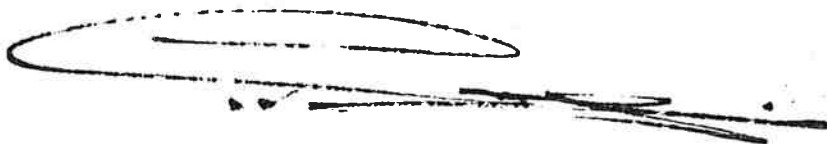
¹ Contemporary CBP may comprise, inter alia, washing-out pits, elevators, conveyor belts, ground hoppers, mixing drums, workspaces and offices, silos, water-tanks, storage areas/tanks, structural supports including foundations

- (b) An occupation permit or a temporary occupation permit shall be applied for, depending on the requirements of the operator or nature of the site, upon satisfactory completion of works in accordance with the provisions of the BO and regulations; and
- (c) Enforcement action under the BO in accordance with the prevailing policy for the control of unauthorized building works will be taken against new CBP and associated structures erected after 31 March 2002 without prior approval and consent.

Existing CBP

- (d) Action against existing CBP erected prior to 1 May 2002 will not be taken if their structural safety can be demonstrated through submission of satisfactory appraisal reports by a RSE by 30 October 2002 and such plant is properly maintained. This notwithstanding, other government departments may still initiate enforcement actions against individual CBP which fails to comply with the relevant provisions under applicable Ordinances, or respective land use requirements.

5. In the longer term, we will explore the feasibility of setting up a statutory system for self-certification of CBP with a total silo capacity less than 50 tonnes and having an overall height less than 15 m.

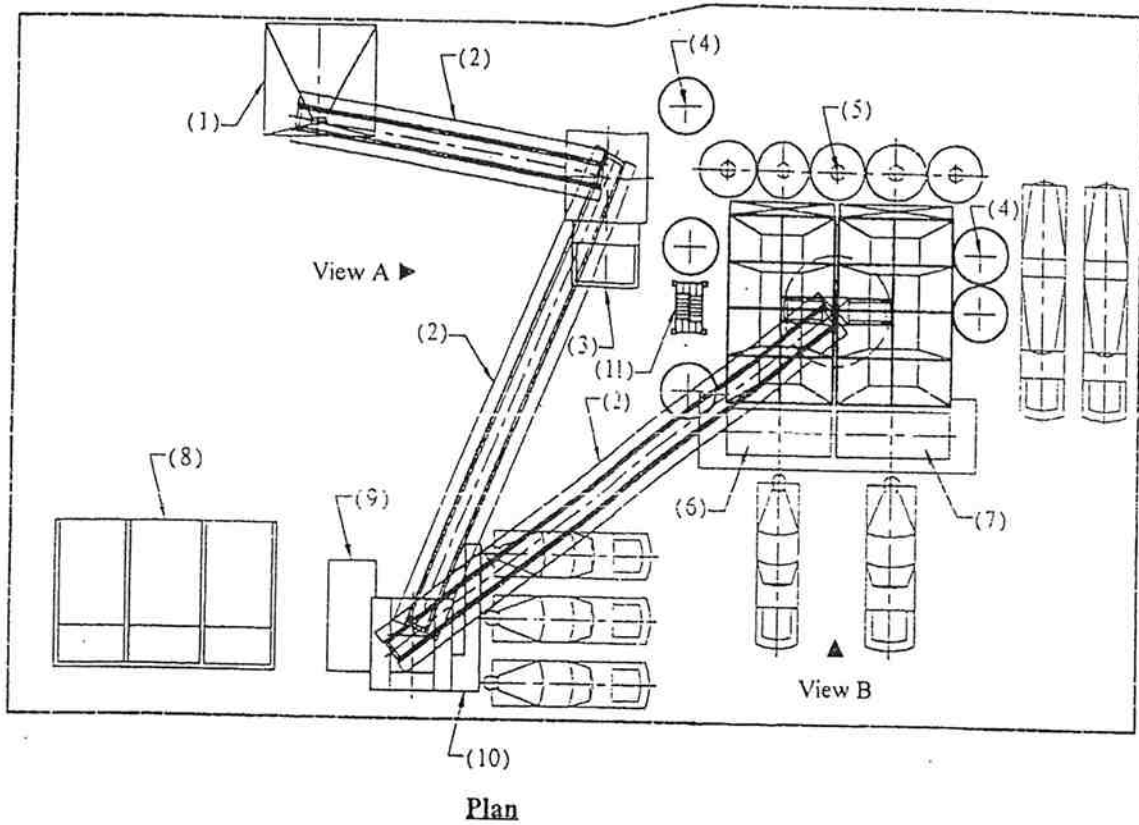


(C M Leung)
Building Authority

Ref.: GP/BORD/73 (II)

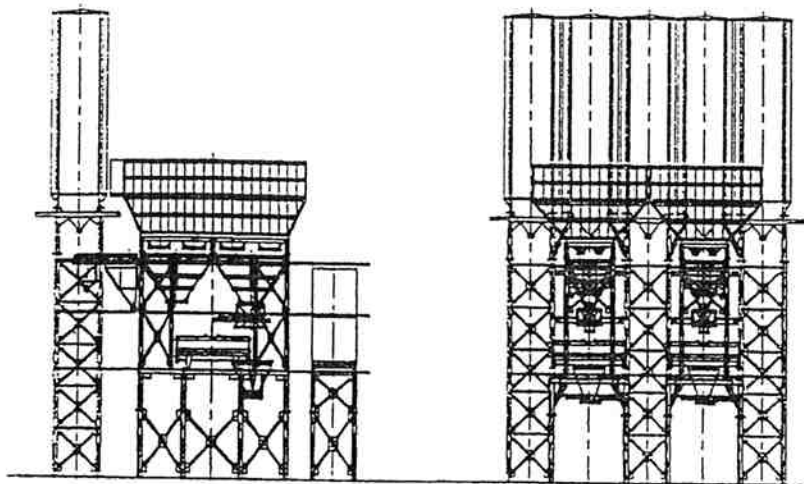
First Issue March 2002 (AD/NB1, AD/NB2)

Index under: Concrete Batching Plant



LEGEND

- (1) UNDERGROUND CHAMBER FOR BARGE
- (2) CONVEYOR BELT
- (3) ICE-CUBE TANK
- (4) WATER TANK
- (5) CEMENT SILO
- (6) CONTROL ROOM
- (7) CONTROL ROOM
- (8) WASTE MATERIALS CHAMBER & WASTE WATER CHAMBER
- (9) STORAGE ROOM
- (10) TESTING PLATFORM
- (11) STAIRCASE



View A

View B

Elevations

(Some parts of the plant are omitted for the sake of clarity)

A typical 2-production line concrete batching plant

In respect of those type of CBP's as shown in Appendix A (the number of production lines may vary) the following arrangements under the BO will be accepted: -

New CBP

- Requirements for Fire Resisting Construction (FRC) will be waived provided no part of the CBP is within 1800mm of the site boundary other than a sea wall and the gross floor area (GFA) of the control room does not exceed 30m² per production line. Water storage tanks and settlement pits will normally be allowed up to the site boundary without FRC requirements.
- Means of escape (MOE) requirements will be waived provided that the GFA of the control room does not exceed 30m² per production line and the number of personnel in it does not exceed 5 per production line. The clear width of any staircase access to the control room should be not less than 750mm clear with a handrail each side and with a going not exceeding 45°. Requirements under Building (Planning) Regulation 72 in respect of the identified control room will be waived if the above criteria are met.
- The above waiver on FRC, MOE and Building (Planning) Regulation 72 requirements are subject to the following conditions -
 - (i) the number of production lines does not exceed 4 and
 - (ii) the total GFA of all control rooms does not exceed 100 m².
- If drainage connections or discharges off-site are made any requirements of Drainage Services Department and Environmental Protection Department must be met. Drainage details may be included on the general building plan submission.
- Plot ratio and site coverage calculations may exclude conveyor belts, but not their supporting structures. Plot ratio calculations based on the site coverage area may be accepted subject to extra office floors and the like at other levels being included.

Rearrangement of layout of CBP

- Submissions in respect of minor alteration to the plant layout, after issue of an Occupation Permit or Temporary Occupation Permit involving a conveyor belt support and associated hopper, will be processed within 30 days.

/Relocation

Relocation of an approved CBP

- Relocation of an approved CBP to a new site will be subject to a new 60-day submission, however the original structural calculations may be used subject to reassessment for wind load and ground conditions by a RSE. The structural submission will be processed within 30 days provided the site is similar in all respects to the existing site and satisfies all the requirements as stipulated in Appendix C.
- The general building plan submission will also be processed within 30 days provided referral to other departments (except FSD) is not required. (Practice Note for Authorised Persons and Registered Structural Engineer No 99 is relevant.)

Existing unapproved CBPs

- In respect of existing unapproved CBP's the structural justification required for its stability and integrity will be restricted to basic details of the main structural components and by at least one trial pit in respect of the existing foundations together with an appraisal and inspection report on the existing conditions of all the structural elements and member connections and certification by a RSE for their fitness for use.

Relocation of existing unapproved CBP

- Relocation of an existing unapproved CBP to a new site will be dealt with as a new 60-day submission. In respect of the above ground structural elements justification should be by way of laboratory tests etc together with an appraisal and inspection report on the existing conditions of all the structural elements and certification by a RSE for their fitness for re-use.

Non Typical CBP

- If the plant contains features or accommodation which are not in a typical batching plant, or cannot meet the waiver requirements, the proposal for the whole plant will be processed in the same manner as for an ordinary building.

(3/2002)

Requirements for 30-day processing of structural submissions in respect of 'Relocation of an approved CBP'**(A) Superstructure**

RSE is to certify the following during the plan submission :-

- (i) the structural framing plans, members and connection details are the **same** as the approved plans dated _____ under the reference of BD _____.
- (ii) the structural calculations, including the method of analysis, wind load, dead load, live load and material design stresses and the relevant standards submitted for the approved plans mentioned above have been reviewed and found to be equally applicable to the new CBP now proposed.

(B) Foundations

RSE is to certify the following during the plan submission :-

- (i) the foundation plans showing the foundation system, allowable bearing pressure, type, layout and details are the **same** as the approved plans dated _____ under the reference of BD _____.
- (ii) the structural calculations for the foundation details including the method of analysis, loadings and material design stresses and the relevant standards submitted for the approved plan mentioned above have been reviewed in conjunction with the site investigation report for the CBP now proposed, and are found to be equally applicable to the new CBP now proposed.

(C) Referrals of Superstructure and Foundation Plans

The RSE is to certify that the new CBP proposal does not involve or affect the followings and hence referral to each of the organisation is **not** required.

Does proposal involve or affect the following?	Referral to each of the relevant organisation
Schedule Area No. 1, 2 or 4	Geotechnical Engineering Office
Schedule Area No. 3 or MTR Protection Area	Mass Transit Railway Corporation

/Schedule

Schedule Area No. 5	(a) Geotechnical Engineering Office; and (b) Drainage Services Department
Slopes/Retaining Structures/Deep excavation/disused tunnel	Geotechnical Engineering Office
Culvert, nullah, stream course	Drainage Services Department or Project Manager, Territory Development Department for New Territory area
Kowloon Canton Railway route protection area or proposed rail routes	Railway Division, Highways Department
Light Rail Transit	Light Rail Division, Kowloon Canton Railway Corporation
Structures to be erected in, over, under or upon street	(a) Lands Department; and (b) Highways Department
Highway Structures	Highways Department
Sea walls, adjacent to sea front	Technical Services Division, Civil Engineering Department
Reclamation, piers	(a) Marine Department; and (b) Technical Services Division, Civil Engineering Department
Public drainage	Drainage Services Department
Water mains	Water Supplies Department

Appendix 9D

**Extract from CLP Power Hong Kong
Limited Code of Practice No.101**

3.2.3 The maximum number and type of plant to be accommodated.

3.2.4 Personnel access and equipment access (including power cables).

3.3 Approval of Drawings

3.3.1 Substation layout plans prepared by the building owner / customer's agent (e.g. architects or consultants) shall be submitted for the approval of the Senior Planning and Design Manager of the relevant Region of CLP Power. Regional boundary map in the Appendix A shows the geographical demarcation and contacts of the Regions in CLP Power supply area.

3.3.2 Standard (or typical) substation layout plans submitted by the Hong Kong Housing Authority shall be approved by the Senior Asset Development Manager of the Asset Management Department, CLP Power.

3.3.3 The submitted drawings shall be in both hardcopy and softcopy format. The softcopy shall be in .dwg format and compatible to AutoCAD[®] 2007 version or later version accepted by CLP.

4. **ELECTRICAL EQUIPMENT IN DISTRIBUTION SUBSTATION**

4.1 General Arrangement

Distribution substation consists of main high voltage equipment including high voltage gas insulated switchgear (GIS) or air insulated switchgear (AIS) and distribution transformer. Distribution substation can also be named as transformer room where transformer(s) are installed. High voltage switchgear room is for substation where only high voltage switchgear panels are installed.

Substations located on ground floor shall be equipped with silicone oil filled transformers or equivalent as a standard to avoid the need for a fixed fire fighting installation for the substation. Substations sited other than on ground floor such as basement and upper level of a building shall be equipped with non-flammable type transformers which have higher fire safety standard. Non-flammable transformers include SF₆ gas insulated, dry type and silicone fluid filled types.

CLP Power will determine the suitable type of non-flammable transformer to be used by considering the conditions of the substation site.

4.2 Types of Electrical Equipment

4.2.1 A substation shall normally accommodate the following equipment.

11kV switchgear	- This normally consists of the total number of panels required for the particular project plus one spare panel for future purpose.
Distribution transformer	- One to three transformers as required.
LV board	- One to three boards per substation.
LV capacitor bank	- One per transformer.
LV fuse cutout unit	- One per LV capacitor.
30V battery and charger	- One for 5 units or less 11kV switchgear panels. Two for more than 5 units.
Pilot marshalling boxes	- Two per substation.
Fibre optic marshalling box	- Two per substation.
Remote terminal units	- Consisting of Customer Remote Terminal Unit (CRTU) and Low Voltage Remote Terminal Unit (LRTU). One to two for each type per substation.
Meter summation panel	- One per substation.

4.2.2 The number of LV boards in a substation will normally be one to three units. The LV boards will be connected to other substations by LV cable interconnectors in order to improve the reliability of the LV supply to the customer. Senior Planning and Design Manager will determine the number of LV boards and LV cable interconnectors to be installed for the substation.

4.2.3 The battery/charger unit, pilot marshalling box, fibre optic marshalling box and remote terminal unit shall be wall-mounted.

4.3 Equipment Dimensions, Weights and Operation Space

Due to the variety and continuous improvement of equipment in feature and safety, the type of the equipment and hence its dimensions and weight may vary from time to time. The substation layout is subjected to the equipment being used.

In general, the minimum clearances and safe operating areas required around the electrical equipment shall be :

- | | |
|--------------------------------------|---|
| 11kV switchgear | - 1000mm at the back of the panels.
- 1500mm in front of 11kV circuit breakers. Where metering circuit breaker panels are installed, 2000mm for the operation of the VT lifting trolley may be required.
- 750mm on the other two sides of the switchboard. |
| Distribution transformer | - 900mm around the LV terminals.
- 750mm on the other sides. |
| LV board | - 1000mm in front of the board.
- 750mm on the sides where cables turn in and out.
- The cable trench edge shall be 120mm from wall. |
| LV capacitor bank | - 750mm in front and 200mm on two or rear sides. |
| LV fuse cutout unit for LV capacitor | - 1000mm in front of cutout. |

4.4 Foundations

- 4.4.1 The transformer foundation/plinth shall be capable of supporting a minimum load of 9000kg. The minimum loading of the passage for delivery of the transformer from the unloading point to the transformer plinth shall be sufficient to support the transformer weight. Normally, the transformer is supported by two metallic frames in form of channels or inverted U-channels or four steel wheels which stand on the transformer foundation/plinth. The plinth strength shall be adequate to stand for the pressure imposed by transformer base channels or wheels.

- 4.4.2 The minimum dimensions of the transformer plinth should be 1.8m long x 1.3m wide and level with finished floor level. Actual plinth size is subjected to the transformer rating and type.
- 4.4.3 The 11kV switchgear foundation shall be capable of supporting a maximum static plus dynamic load of 17kN per panel. The minimum cover between the finished floor level and the reinforcement bar of the foundation shall be 80mm. The floor surface shall be flat and within a tolerance of 1mm in 1000mm.

4.5 Earthing Design for Electrical Equipment

Earthing design for the electrical equipment shall be in compliance with CLP Power earthing standard. The designer or builder of the distribution substation should coordinate with Senior Planning and Design Manager of CLP Power for the provisions of the earthing installation.

For the connection of CLP earthing network outside the distribution substation, the earthing bars which are provided and installed by the building owner for the distribution substation shall be extended to the location(s) where CLP supply cables enter the site owned by the building owner.

4.6 Equipment for Metering at High Voltage Supply

When metering of high voltage supply is used, additional space and building provisions shall be required in the substation for accommodating the HV metering equipment. The building owner shall agree with CLP Power to provide enough space and provisions in the substation.

5. ARCHITECTURAL/CIVIL DESIGN

5.1 General Requirements

- 5.1.1 All substations shall comply with the Hong Kong Electricity Ordinance (Cap. 406), the Hong Kong Buildings Ordinance (Cap. 123) and the “Fire Services Requirements for Consumer Substations using Oil Filled Transformers and Switchgear in Buildings” (latest version of NP 101), Part X of FSD Circular Letter no. 4/96, Part X.2 of FSD Circular Letter no. 5/98 and the related Codes of Practice on Fire Services.
- 5.1.2 Substations shall be situated at the periphery of the building and be accessible at all times. For the substations on ground level, the access route should be directly from open air (non-covered area). Such area should be vertically uncovered and unobstructed. In case the periphery is covered by the canopy of the building, the direct distance from the entry of the substation to the non-covered area should not exceed 2.5m. The permanent access to the substation shall be of adequate height, width and of sufficient strength to accommodate the size and weight of both the transformer and the conveying vehicle. The minimum width for plant delivery shall not be less than 3 meters taking into consideration the size of the major electrical plant such as transformers and switchgear being used.
- 5.1.3 For substation location exposing to the risk of flooding such as near an inclined road, slope and sea front, or locating at low principal datum (PD) level, less than 4.4mPD at Victoria Harbour or 5.5mPD at Tolo Harbour, the following anti-flooding measures shall be considered to prevent flooding of the substation:-
- Change the location of the substation from ground floor to upper floor, or;
 - Raise the substation floor level to minimum 4.4mPD at Victoria Harbour or 5.5mPD at Tolo Harbour, or;
 - Install flood prevention facilities such as sump pump and flood gate. Flood gate should be installed in substation to prevent water ingress from door or low level louvre.
- 5.1.4 The layout shall be designed to be adequate for the lifetime of the substation and the ultimate quantities of electrical equipment to be installed such that any civil work in the substation can be avoided or will be minimal when additional electrical equipment is necessary to install.

5.1.5 The substation minimum clear headroom shall be:

- 3.3m above ground for substation without transformer.
- 3.6m above ground for substation with transformer and 630mm diameter exhaust fan.
- 3.8m above ground for substation with transformer and 800mm diameter exhaust fan.

The recommended maximum ceiling height is 4m but subjected to the required clearance of lifting hoist on the ceiling if provided.

5.1.6 The substation ceiling and customer main switchroom ceiling shall be of suitable waterproof construction to prevent water leakage. No water pipe, drainage pipe or customer's installation shall be located in the substation or located in and passing through any part of and inside the ceiling slab of the substation. Decorative structure / add-on material applied on the ceiling surface of the substation will not be allowed.

5.1.7 To avoid water seepage / leakage into the substation from the floors above the substation, double slab ceiling with waterproofing construction and drainage system or equivalent design shall be constructed by the building owner / customer of the substation. The double slab ceiling or equivalent design shall first be agreed with CLP Power and shall be approved by the Authorized Person (AP) (as defined under the Buildings Ordinance) of the developer and/or the building owner of the substation.

The developer and / or the building owner of the substation is recommended to follow the standard requirement of double slab, which headroom of 1000mm under slab and 600mm underneath beam. However, in case the developer has encountered specific site difficulties and with substantiation provided such as:

- 1) site constraint;
- 2) height restriction;
- 3) tight construction programme.

The following alternative solutions will also be accepted by CLP:-

- i) Transfer slab with minimum thickness of 1000mm;
- ii) minimum 600mm under slab

There shall be no left in timber formwork inside the void after casting the concrete to avoid breeding of organisms.

Other alternative arrangements proposed such as light weight ceiling / non-structural double slab with water proofing are required to be substantiated by the developer with life time performance not worse than double slab design for CLP consideration.

- 5.1.8 No civil expansion joint shall be located in any part of the substation.
- 5.1.9 Not more than 3 transformers shall be accommodated within any one transformer room.
- 5.1.10 Ground level substations should be at least 150mm higher than the outside (pavement) level to reduce the risk of flooding.
- 5.1.11 Substation walls shall be made of reinforced concrete or concrete block of BS 6073 Part A with a compressive strength of not less than 20N/mm² and tiled up to a height of 1500mm above floor level with 150mm x 150mm white ceramic tiles. Above the tiles, the wall and the ceiling should be cement and sand plastered and finished with one coat of liquid prepolymer sealing and two finishing coats of white acrylic resin based coating in glossy finish.
- 5.1.12 The substation floor should be cement and sand rendered with trowelled smooth finish and painted with one coat of polyurethane sealer and two coats of grey epoxy dustproof coating.
- 5.1.13 When single core cables are used for the connection between the 11kV/LV transformer LV terminals and the customer's switchgear, the customer main switchroom should be immediately adjacent to, above or below the substation. Cable sealing to 2-hour fire resistance rating (FRR) by 'Multi-Cable Transit' (MCT) system shall be used.
- 5.1.14 The openings for cable inlet shall be properly sealed by CLP Power so as to prevent water ingress into the substation and be of 2-hour FRR construction. The method of sealing shall be referred to CLP Power's duct sealing standard.
- 5.1.15 For laying of temporary supply cables from the substation, a 150mm x 150mm through wall opening at high level on the perimeter wall of the substation shall be provided. The opening shall be sealed by removable stainless steel cover with waterproof gasket. The cover shall be fitted on both inside and outside of the substation.
- 5.1.16 All external steelwork shall be stainless steel of the low carbon type, Grade 316L (Japanese SUS 316L or US AISI 316L). This specification applies to all doors, door frames, louvres, rat guards, etc. The stainless steel substation door should not be painted to avoid maintenance due to aging of the painting.

- 5.1.17 Internal steelwork (air trunking hangers, chequer plate, etc.) should be hot dip galvanised and finished with one coat of calcium plumbate or zinc phosphate primer and two finishing coats of grey synthetic paint.
- 5.1.18 Adequate ventilation to open air by means of permanent installation which is completely segregated from ventilation system of the main building should be provided.
- 5.1.19 A recess for sump pump in the deepest cable trench shall be constructed for placing the sump pump to extract water in the cable trench when necessary.
- 5.1.20 No storage of transformer insulant or switchgear insulant is allowed in the distribution substation or customer main switchroom.
- 5.1.21 The typical distribution substation layouts in this Code of Practice should be used whenever possible.
- 5.1.22 Black/Yellow colour stripes shall be painted on the edge/step where floor level change.
- 5.1.23 When stair is built for accessing the substation, handrailing shall be installed along the stair and the stair nosing (the front edge of the stair step) should use durable yellow colour tile or shall be painted by durable yellow colour reflective paint.
- 5.1.24 Adequate exit signage and emergency lights in compliance with the relevant BD, FSD regulations shall be provided along the emergency exit route of distribution substation.

5.2 Additional Requirements for Basement Substations

- 5.2.1 Basement substations shall be directly accessible from the open air at ground level by a separate and independent staircase.
- 5.2.2 Multiple substations on the same floor and are in close proximity may share one separate and independent staircase(s) leading to ground level in lieu of one staircase for each substation.
- 5.2.3 When the staircase or access route from the exit of the basement substation to ground floor is longer than 10m of travel, adequate natural or mechanical ventilation installation shall be provided. (For details, refer to the Section on Ventilation Design in this COP)

- 5.2.4 Basement substations should not be located at the lowest basement level to reduce the risk of flooding. Under the substation, there should be at least one accessible basement floor where drainage system is installed to prevent flooding.
- 5.2.5 A protected lobby with self-closing doors fitted with panic bolt leading to the adjacent communal area of the building shall be provided.
- 5.2.6 A vehicular access leading from street level to the substation should be provided for equipment delivery.
- 5.2.7 Emergency exit route diagram shall be provided in the substation.
- 5.2.8 Subjected to the configuration of the 11kV supply network, provision of a 11kV switch room(s) on ground level will be required as a switching substation for the 11kV cables supplying the building.
- 5.2.9 A fan room should be provided at ground level for accommodating the ventilation fans for the substation. Access and adequate working space shall be provided.
- 5.2.10 A suitable damp-proof course shall be provided on the outside of all external walls which are below ground level to separate the substation from unexcavated ground.
- 5.2.11 A sump pit with sump pump of minimum pumping capacity of 3 litres per second and sufficient head and removable covers shall be provided. A high water level detector shall be fitted in the sump pit to raise an alarm inside the substation and shall activate the substation monitoring alarm system. A drainage pipe with valve shall be provided to drain water in the sump pit to the building drainage system.

A change-over switch shall be provided for the sump pump so as to operate from the customer's supply when necessary.

Flooding alarm light shall be provided at each access point of the basement substation.

An automatic and manual control for the sump pump start/stop shall be provided. A normally open voltage free contact for the flooding alarm is required for substation monitoring alarm system by Distribution Automation. This alarm contact shall be provided in a weatherproof enclosure to IP55 located in the substation.

5.3 Additional Requirements for Upper Floor Substations (maximum fifth floor or maximum 17m above ground level)

- 5.3.1 Upper floor substations should be located at the periphery of the building. Substations should be directly accessible by a separate and independent staircase.
- 5.3.2 The access and exit route of the upper floor substation shall always lead to the ground level of the building. Any lockable door, gate, barrier along the route shall be avoided.
- 5.3.3 A protected lobby with self-closing doors fitted with panic bolt leading to the adjacent communal area of the building shall be provided.
- 5.3.4 Clear, durable signage to indicate the location of the substation in the building shall be displayed at suitable places to guide personnel to access the substation. The layout of the signage shall be agreed by CLP Power. Emergency exit route diagram shall be provided in the substation.
- 5.3.5 Multiple substations on the same floor and are in close proximity may share one separate and independent staircase(s) leading to ground level in lieu of one staircase for each substation.
- 5.3.6 When the staircase or access route from the exit of the substation to ground level is longer than 10m of travel, adequate natural or mechanical ventilation installation shall be provided. (For details, refer to the Section on Ventilation Design in this COP)
- 5.3.7 Equipment access can be from a public area inside the building:
- (i) through a slab opening, or
 - (ii) by a vehicular access

The loading and unloading area for the delivery of equipment in or out of the substation should be within the building area where it is owned or managed by the building owner. Using the public pavement or road outside the substation as loading and unloading area should be avoided. Access passage for equipment shall be at least 3m wide and 2.8m high.

In the case of equipment access through a floor opening, the opening shall be provided with removable R.C. covers of 2-hour FRR construction. Removable stainless steel railing shall be provided to securely fenced the floor opening to a height of 900-1150mm with mid-rail between 450-600mm. An I-beam together with an electrical hoist for lifting minimum 9000kg load (actual required loading is subjected to the equipment used) in the substation shall be provided

and maintained by the building owner. An emergency lowering device with handwheel shall also be provided. The clear height of the hoisting equipment to the substation floor shall be minimum 3700mm under the hook.

A change-over switch shall be provided for the electric hoist to operate from either the customer's essential supply or the substation local supply.

5.3.8 Subjected to the configuration of the 11kV supply network, provision of a 11kV switch room(s) on ground level will be required as a switching substation for the 11kV cables supplying the building.

5.3.9 Independent cable riser rooms shall be provided solely for CLP Power's cables, constructed to 2-hour FRR and have access from a public area within the building. More than one stack of cable riser rooms may be required that will be determined by the electric power demand of and cable riser location in the building.

Normally, the cable riser room height should not be greater than 4m. Otherwise, adequate space shall be reserved inside the cable riser room for the erection of working platform for working at high level inside the room.

Cable riser room access doors shall be 2-hour FRR. Inside the cable riser room, opening on the floor and ceiling slabs shall be provided for installation of cables. The opening shall be sealed up with 2-hour FRR material by the building owner after installation of the cables.

A lifting beam and trolley shall be provided at the highest or intermediate cable riser room to facilitate cable installation. The lifting load shall be 500kg minimum. Actual required loading is subjected to the cable length. Hooks for fastening of safety harness shall be provided at suitable locations when the access to the lifting beam/trolley is more than 2m above floor.

5.3.10 Hooks for fastening of independent lifeline should also be provided at the ceiling of the highest cable riser room. This hook shall be with similar installation method as those haulage lug and lifting eye as shown in drawing T-COP-10250-D-E33-0101-20. The safety loading of each hook is 2 tons.

5.4 Additional Requirements for High Level Substations (above fifth floor or 17m above ground level)

5.4.1 The substations shall be located on the mechanical services plant floor and at the periphery of the building.

- 5.4.2 When there is a refuge floor or another mechanical services plant floor is directly above or below the level where the substation is located, an independent staircase shall be provided in the substation to the refuge floor or another mechanical services plant floor as an additional route for emergency evacuation.
- 5.4.3 Multiple substations on the same floor and are in close proximity may share a separate and independent staircase(s) leading to the refuge floor or another mechanical services plant floor in lieu of one staircase for each substation.
- 5.4.4 Subjected to the configuration of the 11kV supply network, provision of a 11kV switch room(s) on ground level will be required as a switching substation for the 11kV cables supplying the building.
- 5.4.5 The access and exit routes of the high level substation shall always lead to the ground level of the building. Any lockable door, gate, barrier along the route shall be avoided.
- 5.4.6 The exit door(s) shall be opened to a protected lobby with self-closing doors fitted with panic bolt leading to the adjacent communal area of the building.
- 5.4.7 Clear, durable signage to indicate the location of the substation in the building shall be displayed at suitable places to guide personnel to access the substation. The layout of the signage shall be agreed by CLP Power. Emergency exit route diagram shall be provided in the substation.
- 5.4.8 Equipment access shall be by a lift in the public area inside the building. The lift in the building shall be capable to carry the heaviest equipment in the substation such as transformer. This lift shall be able to change-over to the essential supply of the building when its normal supply fails. The lift designer should coordinate with Senior Planning and Design Manager of CLP Power on the loading requirement of the lift.
- Access passage for equipment shall be at least 3m wide and 2.8m high. Bigger access may be required in case of special applications.
- 5.4.9 Independent cable riser room shall be provided solely for CLP Power's cables, constructed to 2-hour FRR and have access from a public area within the building. More than one stack of cable riser rooms may be required that will be determined by the electric power demand of and location in the building.

Normally, the cable riser room height should not be greater than 4m. Otherwise, permanent steel working platform with wire mesh floor of live load not less than 0.75kPa and proper access shall be provided for every 4m inside the cable riser room for cable laying work at high level.

Cable riser room access doors shall be 2-hour FRR. Inside the cable riser room, opening on the floor and ceiling slabs shall be provided for installation of cables. The opening shall be sealed up with 2-hour FRR material by the building owner after installation of the cables.

A lifting beam and trolley shall be provided at the highest level and when required the intermediate floor level of the cable riser room to facilitate cable installation. The lifting load shall be determined by the weight of the heaviest cable at its full length.

- 5.4.10 Hooks for fastening of independent lifeline should also be provided at the ceiling of the highest cable riser room. This hook shall be with similar installation method as those haulage lug and lifting eye as shown in drawing T-COP-10250-D-E33-0101-20. If the total height of cable riser is more than 30 metres, hooks shall be installed on the ceiling of riser room(s) in the intermediate levels provided the maximum distance between each 2 hooks is less than 30 metres. The safety loading of each hook is 2 tons.
- 5.4.11 Cable jointing room, 3m by 3m, constructed to 2-hour FRR on each mechanical plant floor from the ground to the substation shall be provided to allow future cable repair/replacement.
- 5.4.12 A cable unloading area next to the cable riser room on ground level shall be provided for uncoiling the cable from the cable drum and laying to the cable riser room. The space for this unloading area varies for different cases, and shall be determined by CLP Power Planning Engineer.

5.5 Cable Trenches, Cable Ducts and Draw Pits

The cross-sectional areas of cable trenches shall not be reduced by ground beams or other civil structures. Power cables of different voltages should be segregated in different cable trenches. The invert level of cable trenches at the boundary of a substation should be 1050mm (if trench depth is 1200mm) below pavement level. If ground beams are present at the boundary of a substation, the clearance under the beams shall be 500mm minimum. A recess inside the cable trench should be constructed for placing the sump pump at the lowest level of the trench.

The cable trench steel chequer plates shall be marked with numbers (left to right and clockwise convention) to avoid being misplaced. Proper supports such as a removable angle iron should be provided at the bends and tee-points.

5.5.1 HV Cable Trenches

HV cable trenches shall be generally 1200mm deep.

5.5.1.1 800mm wide for 11kV switchgear panels;

5.5.1.2 600mm wide for 11kV cables from 11kV switchgear to transformers; the final section which leads to the transformer HV terminal could be 300mm wide.

5.5.2 LV Cable Trenches

5.5.2.1 LV cable trenches should generally be 800mm wide x 1200mm deep.

5.5.2.2 Trench for LV single core cables from the transformers to customer main switchroom should be 1000mm wide x 1200mm deep for 4 MCT's. The maximum length of this section of trench is limited to 20m.

5.5.3 Pilot Cable Trench

A short trench 400mm wide x 1000mm deep should be extended to where the pilot cable marshalling boxes are installed.

5.5.4 Trenches, Cable Ducts and Draw Pits Construction

Except cable trenches inside the substation, all cable trenches, cable ducts and draw pits outside the substation are required to fully fill up with sand or sifted soil or sand bags at all time after cabling by CLP Power is completed.

All trenches shall be covered with 6mm thick steel chequer plates. In the case of a suspended trench, the trench walls shall be constructed to 2-hour FRR. All junctions of trenches shall be chamfered to 150mm x 150mm.

Both sides of the cable trench under the 11kV switchgear shall be of dense concrete construction to a minimum width of 200mm for switchgear support.

Design of cable trough for inclined surface shall be in compliance with CLP standard. Details refer to CLP Drawing 'Typical Cable Trough in Slope T-GEN-25500-D-E33-0226-01' when required.

5.5.5 Trench Outlet

5.5.5.1 All trench outlets should have the same width as the trench and 150mm diameter G.I. sleeves shall be provided.

5.5.5.2 For basement and upper floor substations, adequate number of MCT holes should be provided for incoming power cables and pilot cables, taking into account the number of 11kV panels in the substation.

5.6 Doors

Substation doors shall be made of stainless steel. Substation which have doors open over a street, the doors shall be built such that when they are fully opened, which will not cause an obstruction to any person or vehicle using the street. For typical substation design, the door should be able to open outwards into an unobstructed space with a 180° swing.

The following notice plate shall be installed by CLP Power:

- 'DANGER'
- Wear safety helmet
- Substation nameplate
- SF₆ gas-filled equipment warning plate for substations with SF₆ equipment installed.

Fixed Fire Fighting Installation Notice plate shall be provided by the building owner / customer when required.

25mm diameter galvanised steel eye bolts should be installed on internal wall on both sides of all doors at 1m above the floor for hanging a temporary caution notice. A stainless steel box shall also be provided to store a 3m long plastic chain (Box dimension : 125mm length x 125mm wide x 125mm high).

5.6.1 Type of Door

5.6.1.1 Double leaf door shall be normally 2600mm wide and 2800mm high for transformer access. Actual door size is subjected to the transformer rating and type.

A 700mm wide x 2100mm high wicket door with handles shall be provided in one leaf for personnel access.

Drawings No. T-COP-10250-D-E33-0103-16 and T-COP-10250-D-E33-0103-17 show the details of this type of door.

- 5.6.1.2 Double leaf door 1500mm wide x 2500mm high shall be provided for 11kV switchgear and personnel access. Actual door size is subjected to the switchgear rating and type. Drawing No. T-COP-10250-D-E33-0103-20 shows this type of door.
- 5.6.1.3 Single door 930mm wide x 2100mm high with handles shall be provided for personnel access and exit. Drawing No. T-COP-10250-D-E33-0103-14 shows this type of door.
- 5.6.1.4 Single leaf door for personnel access opening to a staircase or exit route shall be self-closing.

For doors which required fire resistance period rating such as 2-hour fire resistance rating (FRR) such as 2-hour in terms of integrity (and insulation when necessary) shall comply with the relevant requirements of the Buildings and Fire Services Regulations such as the Code of Practice for Fire Safety in Building 2011 and latest corrigenda by Buildings Department and shall have relevant approval certificates / documents accepted by Building Department. The design shall be agreed by CLP Power. (Note: the drawings in this Code of Practice are only indicative in terms of door design, dimensions, wickets, etc.).

5.6.2 Lock

A substation shall have only one designated personnel access door and this door shall be fitted with an emergency exit deadlock set with panic bar and flush key hole.

A second, or emergency exit door should be provided for substations longer than 10m (possibly a wicket door in a double leaf door). Such an emergency exit will be provided with a panic bar which will operate top and bottom bolts of the door, without key.

In case of a double leaf switchgear access door an emergency exit deadlock set with panic bar will operate one leaf of the door if this is the only access.

Main double leaf transformer access doors will lock by top and bottom bolts inside the substation.

5.6.3 Controlled Access

The access need to be controlled to ensure that only authorized staff, contractors and visitors pass through by means of access control and intruder detection system. Metallic conduit system for access control should be provided from each access door to the pilot marshalling box. Detail refer to drawing T-COP-72000-D-E33-0103-23-A-A.

5.7 Substation Name

The following principles shall be followed when naming distribution substations :-

- (i) Building name, or
- (ii) Street and street number, or
- (iii) Village name, or
- (iv) The generally accepted location name.

The substation name shall not be more than 25 characters and the above shall be in both English and Chinese.

5.8 Vermin Proofing

Some distribution substations are located in buildings with a dusty, damp and vermin infested environment. Vermin are usually small animals such as rats, lizards and birds, etc. and insects are cockroaches and flies, etc. To avoid problems of hygiene, corrosion and risk of insulation breakdown inside the electrical equipment caused by the vermin, vermin proofing is normally achieved by a combination of means. The substation building itself will act as the first line of defense while the electrical equipment design will act as the second.

In case of indoor substations, the first line of defense shall be by means of :

- Substation walls
- Doors
- Rat guards at ventilation louvres and grills
- Sealing of cable trench openings.

Electrical equipment in substations is designed to different degrees of protection according to IEC 60529. Typical 11kV switchgear is designed to IP4X while the LV boards are to IP2X. Therefore, the substation design shall provide an effective vermin proofing means as the first line of defense to protect the equipment.

In case of outdoor substations, vermin proofing mainly depends on the electrical equipment itself.

5.9 Stainless Steel for Substation External Steelwork

5.9.1 Material used shall be Grade 316L stainless steel. This is a nickel-chromium steel containing molybdenum and a small amount of carbon. This steel is well suited to external applications particularly coastal areas.

5.9.2 The Japanese standard for this steel is SUS 316L. The American equivalent is AISI 316L.

5.9.3 The following notes relate to all external steelwork and in particular the doors :-

(i) The hinges of each door leaf must be designed and constructed to withstand the weight of the door plus 50kg and be not less than four in number per leaf.

(ii) Welding treatment must be suitable for Grade 316L stainless steel and must not create weak spots at the weld. After welding, the weld surface must be brushed clean to remove all welding flux and surface dirt. The surface shall then be solvent cleaned to remove all residual dirt and grease.

(iii) The doors and other external steelwork shall be covered with plastic sheets at the time of installation and such plastic sheets shall not be removed until the building construction work is completed.

5.10 Requirements of Substation External Decorative Louvre

5.10.1 Generally, no external decorative louver should be installed, affixed or attached outside the distribution substation. For special circumstances, the building owner should obtain prior agreement of CLP Power if they wish to add such decoration.

5.10.2 External decorative louvre should not be fixed directly or indirectly onto substation stainless steel doors and ventilation louvres.

5.10.3 The weight and the fixing method of the external decorative louvre shall be certified by the Authorized Person representing the building owner / customer to ensure that it will not impose hazard to our operation staff and the general public. The Authorized Person should also submit this design to the relevant authorities for approval according to the statutory regulation.

5.10.4 The decorative louvre shall not obstruct the access of operation and transport of equipment in and out of the substation. With the decorative louvre, all substation doors should be able to open outwards with 180 degree swing.

- 5.10.5 The external decorative louvre shall not affect the substation ventilation.
- 5.10.6 The decorative louvre shall provide fitting provisions for installing the substation nameplate, danger warning notice etc. and shall not affect the display of the substation nameplate and notice plates.
- 5.10.7 The building owner/management company / customer shall be the owner of the external decorative louvre and responsible for the maintenance of the decorative louvre. Annual inspection of the louver should be carried out by an competent person to confirm its safety.

5.11 Requirements for Vehicular Access

- 5.11.1 In general, the minimum requirements for vehicular access shall be :

Lorry dimension	10.5m (L) x 2.6m (W)
Turning radius of vehicular	9.8m
Headroom for loaded lorry movement	4.6m
Headroom for unloading area	5.5m
Weight for the loaded lorry	24000 kg
Weight for the 1.5 MVA transformer	9000 kg
Plant delivery access	3m (W) x 2.8m (H)

5.12 Plant Delivery

The maximum allowable gradient of ramp for plant delivery shall be in a ratio of 1:12. Level difference between floor inside substation and public pavement should not be greater than 400mm wherever practical.

Appendix 10.1

**Representative Photos of Habitats in the
Study Area**



Construction Sites



Developed Area

Appendix 10.1 Representative Photos of Habitats in the Study Area

(All taken in March 2015)



Abandoned Area



Watercourse (Kai Tak Nalluh)



Artificial Coastline

Appendix 10.1 Representative Photos of Habitats in the Study Area

(All taken in March 2015)

Appendix 10.2

Species List

Appendix 10.2 - Species List (Flora)

Chinese Name	Species Name	Growth Form	Origin	Habitat					Remarks
				Developed Area	Construction Site	Abandoned Land	Watercourse	Artificial Coastline	
Plant									
耳果相思	<i>Acacia auriculiformis</i>	Tree	Exotic	Y					-
台灣相思	<i>Acacia confusa</i>	Tree	Exotic	Y	Y	Y			-
紅桑	<i>Acalypha wilkesiana</i>	Shrub	Exotic	Y					-
小葉米仔蘭	<i>Aglaia odorata</i> var. <i>microphyllina</i>	Evergreen shrub	Exotic	Y	Y				-
常綠臭椿	<i>Ailanthus fordii</i>	Evergreen small tree	Native	Y	Y				Cap. 96; Near Threatened (Rare and Precious Plants of Hong Kong (Status in China))
大葉合歡	<i>Albizia lebbek</i>	Tree	Exotic	Y	Y	Y			-
石栗	<i>Aleurites moluccana</i>	Tree	Exotic	Y	Y	Y			-
黃蟬	<i>Allamanda schottii</i>	Shrub	Exotic	Y					-
異葉南洋杉	<i>Araucaria heterophylla</i>	Tree	Exotic	Y	Y				Vulnerable (IUCN Red List)
假檳榔	<i>Archontophoenix alexandrae</i>	Tree palm	Exotic	Y	Y	Y			-
菠蘿蜜	<i>Artocarpus heterophyllus</i>	Tree	Exotic	Y		Y			-
天門冬	<i>Asparagus cochinchinensis</i>	Scandent subshrub	Native	Y					-
大佛肚竹	<i>Bambusa vulgaris</i>	Clumped tree bamboo	Exotic	Y					-
羊蹄甲屬	<i>Bauhinia</i> sp.	-	-	Y	Y				-
宮粉羊蹄甲	<i>Bauhinia variegata</i>	Tree	Exotic	Y					-
白花洋紫荊	<i>Bauhinia variegata</i> var. <i>candida</i>	Tree	Exotic	Y					-
洋紫荊	<i>Bauhinia</i> x <i>blakeana</i>	Tree	Native	Y	Y				-
白花鬼針草	<i>Bidens alba</i>	Annual herb	Exotic	Y	Y	Y		Y	-
秋楓	<i>Bischofia javanica</i>	Tree	Native	Y	Y	Y			-
苧麻	<i>Boehmeria nivea</i>	Subshrub or shrub	Exotic	Y	Y				-
木棉	<i>Bombax ceiba</i>	Deciduous tree	Exotic	Y	Y	Y		Y	-
籐杜鵑	<i>Bougainvillea spectabilis</i>	Scandent shrub	Exotic	Y					-
土蜜樹	<i>Bridelia tomentosa</i>	Shrub or small tree	Native	Y					-
大鴛鴦茉莉	<i>Brunfelsia calycina</i>	Shrub	Exotic	Y					-
朱纓花	<i>Calliandra haematocephala</i>	Shrub	Exotic	Y					-
紅千層	<i>Callistemon rigidus</i>	Tree	Exotic	Y	Y				-
串錢柳	<i>Callistemon viminalis</i>	Tree	Exotic	Y	Y				-
香港茶	<i>Camellia hongkongensis</i>	Small tree	Native	Y					Cap. 96; & Endangered (Rare and Precious Plants of Hong Kong (Status in China))
番木瓜	<i>Carica papaya</i>	Tree	Exotic	Y	Y				-
小魚尾葵	<i>Caryota mitis</i>	Small tree palm	Exotic	Y	Y				-
木麻黃	<i>Casuarina equisetifolia</i>	Tree	Exotic	Y	Y	Y			-
朴樹	<i>Celtis sinensis</i>	Deciduous tree	Native	Y	Y	Y	Y	Y	-
崩大碗	<i>Centella asiatica</i>	Procumbent herb	Native	Y	Y				-
陰香	<i>Cinnamomum burmannii</i>	Tree or large shrub	Native	Y					-
樟	<i>Cinnamomum camphora</i>	Large tree	Native	Y					-
柚	<i>Citrus maxima</i>	Tree	Exotic	Y					-
柑橘	<i>Citrus reticulata</i>	Small tree	Exotic	Y					-
變葉木	<i>Codiaeum variegatum</i>	Shrub	Exotic	Y					-
朱蕉	<i>Cordyline fruticosa</i>	Perennial shrubby herb	Exotic	Y					-
樹頭菜	<i>Crateva unilocularis</i>	Tree	Exotic	Y	Y				-
鳳凰木	<i>Delonix regia</i>	Tree	Exotic	Y		Y			-
龍眼	<i>Dimocarpus longan</i>	Tree	Exotic	Y					Near Threatened (IUCN Red List)
巴西鐵樹	<i>Dracaena fragrans</i>	Perennial herb	Exotic	Y					-

Appendix 10.2 - Species List (Flora)

Chinese Name	Species Name	Growth Form	Origin	Habitat					Remarks
				Developed Area	Construction Site	Abandoned Land	Watercourse	Artificial Coastline	
Plant									
紅邊鐵樹	<i>Dracaena marginata</i>	Tree	Exotic	Y					-
散尾葵	<i>Dypsis lutescens</i>	Shrub palm	Exotic	Y					Near Threatened (IUCN Red List)
水石榕	<i>Elaeocarpus hainanensis</i>	Small tree	Exotic	Y					-
芋葉藤 (黃金葛)	<i>Epipremnum aureum</i>	Tall climbing plant	Exotic	Y					-
刺桐屬	<i>Erythrina</i> sp.	-	-	Y	Y				-
桉樹	<i>Eucalyptus</i> sp.	-	-	Y					-
高山榕	<i>Ficus altissima</i>	Tree	Exotic	Y					-
垂葉榕	<i>Ficus benjamina</i>	Tree	Exotic	Y					-
印度榕	<i>Ficus elastica</i>	Tree	Exotic	Y					-
對葉榕	<i>Ficus hispida</i>	Shrub or small tree	Native	Y		Y			-
細葉榕	<i>Ficus microcarpa</i>	Tree	Native	Y	Y	Y	Y		-
菩提樹	<i>Ficus religiosa</i>	Tree	Exotic	Y	Y	Y			-
筆管榕	<i>Ficus subpisocarpa</i>	Tree	Native	Y	Y	Y	Y	Y	-
青果榕	<i>Ficus variegata</i>	Shrub or tree	Native	Y	Y				-
大葉榕	<i>Ficus virens</i>	Tree	Native	Y	Y	Y	Y	Y	-
大紅花	<i>Hibiscus rosa-sinensis</i>	Evergreen shrub	Exotic	Y					-
黃槿	<i>Hibiscus tiliaceus</i>	Evergreen shrub or tree	Native	Y	Y			Y	-
大白茅	<i>Imperata cylindrica</i> var. <i>major</i>	Perennial herb	Native	Y					-
牽牛	<i>Ipomoea nil</i>	Annual twining herb	Exotic	Y		Y			-
龍船花	<i>Ixora chinensis</i>	Shrub	Native	Y					-
龍柏	<i>Juniperus chinensis</i>	Tree	Exotic	Y					-
洋吊鐘	<i>Kalanchoe tubiflora</i>	-	Exotic	Y		Y			-
複羽葉樂樹	<i>Koelreuteria bipinnata</i>	Tree	Exotic	Y					-
大花紫薇	<i>Lagerstroemia speciosa</i>	Large tree	Exotic	Y	Y				Cap. 96
馬纓丹	<i>Lantana camara</i>	Shrub	Exotic	Y	Y	Y			-
銀合歡	<i>Leucaena leucocephala</i>	Shrub	Exotic	Y	Y	Y	Y		-
山指甲	<i>Ligustrum sinense</i>	Deciduous shrub or tree	Native	Y	Y				-
楓香	<i>Liquidambar formosana</i>	Deciduous tree	Native	Y					-
荔枝	<i>Litchi chinensis</i>	Tree	Exotic	Y					-
潺槁樹	<i>Litsea glutinosa</i>	Tree	Native	Y					-
蒲葵	<i>Livistona chinensis</i>	Tree palm	Exotic	Y	Y	Y			-
紅花欖木	<i>Loropetalum chinense</i> f. <i>rubrum</i>	Deciduous shrub or small tree	Exotic	Y					-
血桐	<i>Macaranga tanarius</i> var. <i>tomentosa</i>	Tree	Native	Y	Y	Y		Y	-
垂花懸鈴花	<i>Malvaviscus arboreus</i> var. <i>penduliflorus</i>	Shrub	Exotic	Y					-
杧果	<i>Mangifera indica</i>	Evergreen tree	Exotic	Y					-
花葉竹芋	<i>Maranta bicolor</i>	Perennial herb	Exotic	Y					-
白千層	<i>Melaleuca cajuputi</i> subsp. <i>cumingiana</i>	Tree	Exotic	Y	Y				-
苦楝	<i>Melia azedarach</i>	Deciduous tree	Exotic	Y	Y	Y	Y	Y	-
紅毛草	<i>Melinis repens</i>	Perennial herb	Exotic	Y	Y	Y			-
白蘭	<i>Michelia x alba</i>	Tree	Exotic	Y		Y			Cap. 96
薇甘菊	<i>Mikania micrantha</i>	Perennial herb	Exotic	Y	Y	Y			-
含羞草	<i>Mimosa pudica</i>	Shrub	Exotic	Y		Y			-
龜背竹	<i>Monstera deliciosa</i>	Climbing shrub	Exotic	Y					-

Appendix 10.2 - Species List (Flora)

Chinese Name	Species Name	Growth Form	Origin	Habitat					Remarks
				Developed Area	Construction Site	Abandoned Land	Watercourse	Artificial Coastline	
Plant									
桑	<i>Morus alba</i>	Shrub or tree	Native	Y	Y	Y	Y	Y	-
南美假櫻桃	<i>Muntingia calabura</i>	-	Exotic	Y					-
九里香	<i>Murraya paniculata</i>	Small tree	Exotic	Y					-
夾竹桃	<i>Nerium oleander</i>	Large shrub	Exotic	Y					-
類蘆	<i>Neyraudia reynaudiana</i>	Perennial herb	Native			Y		Y	-
海南紅豆	<i>Ormosia pinnata</i>	Evergreen tree	Exotic	Y					-
桂花	<i>Osmanthus fragrans</i>	Evergreen tree or shrub	Exotic	Y					-
酢漿草	<i>Oxalis corniculata</i>	Perennial herb	Native	Y					-
紅花酢漿草	<i>Oxalis debilis</i> subsp. <i>corymbosa</i>	Perennial herb	Exotic	Y					-
大黍	<i>Panicum maximum</i>	Perennial herb	Exotic			Y			-
南美西番蓮	<i>Passiflora suberosa</i>	Herbaceous vine	Exotic			Y			-
日本葵	<i>Phoenix roebelenii</i>	Small tree palm	Exotic	Y	Y				-
側柏	<i>Platycladus orientalis</i>	Tree	Exotic			Y			Near Threatened (IUCN Red List)
雞蛋花	<i>Plumeria rubra</i>	Tree	Exotic	Y	Y				-
番石榴	<i>Psidium guajava</i>	Tree	Exotic	Y	Y	Y			-
安石榴	<i>Punica granatum</i>	Shrub or small tree	Exotic	Y					-
炮仗花	<i>Pyrostegia venusta</i>	Vine	Exotic	Y					-
王棕	<i>Roystonea regia</i>	Tree palm	Exotic	Y	Y				-
虎尾蘭	<i>Sansevieria trifasciata</i>	Perennial herb	Exotic	Y					-
傘樹	<i>Schefflera actinophylla</i>	-	Exotic	Y					-
鵝掌藤	<i>Schefflera arboricola</i>	Scandent shrub	Exotic	Y					-
鐵刀木	<i>Senna siamea</i>	Tree	Exotic			Y			-
黃槐	<i>Senna surattensis</i>	Shrub or small tree	Exotic	Y					-
少花龍葵	<i>Solanum americanum</i>	Herb	Exotic	Y					-
龍葵	<i>Solanum nigrum</i>	Annual herb	Native			Y			-
火焰木	<i>Spathodea campanulata</i>	Tree	Exotic	Y					-
假蘋婆	<i>Sterculia lanceolata</i>	Semi-deciduous tree	Native	Y					-
合果芋	<i>Syngonium podophyllum</i>	Herb	Exotic	Y					-
蒲桃	<i>Syzygium jambos</i>	Tree	Exotic	Y	Y				-
黃鐘木	<i>Tabebuia chrysantha</i>	Small tree	Exotic	Y					-
紅花風鈴木	<i>Tabebuia rosea</i>	-	Exotic	Y					-
欖仁樹	<i>Terminalia catappa</i>	Large tree	Exotic			Y		Y	-
小葉欖仁	<i>Terminalia mantaly</i>	-	Exotic	Y					-
黃花夾竹桃	<i>Thevetia peruviana</i>	Shrub or small tree	Exotic	Y	Y	Y		Y	-
巴西野牡丹	<i>Tibouchina semidecandra</i>	-	Exotic	Y					-
大絲葵	<i>Washingtonia robust</i>	Tree palm	Exotic	Y					-
三裂葉蟛蜞菊	<i>Wedelia trilobata</i>	Perennial herb	Exotic	Y	Y				-
狐尾椰子	<i>Wodyetia bifurcata</i>	-	Exotic	Y					-
兩面針	<i>Zanthoxylum nitidum</i>	Woody vine	Native			Y			-

* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status column

Appendix 10.2 - Species List (Fauna)

Chinese Name	Common Name	Species Name	Habitat					Conservation status	Distribution	Rarity	Remarks	
			Developed Area	Construction Site	Abandoned Land	Watercourse	Artificial Coastline					Marine
Avifauna												
八哥	Crested Myna	<i>Acridotheres cristatellus</i>	7	15	35				-	Widely distributed in Hong Kong	Common resident	
家八哥	Common Myna	<i>Acridotheres tristis</i>		3					-	Found in Mai Po, Sheung Uk Tsuen, Sheung Shui, Kam Tin, Shek Kong, Ping Shan, Mong Tseng	Uncommon resident	
磯鶻	Common Sandpiper	<i>Actitis hypoleucos</i>						4	-	Widely distributed in wetland area throughout Hong Kong	Common passage migrant and winter visitor	
普通翠鳥	Common Kingfisher	<i>Alcedo atthis</i>				1	2		-	Widely distributed in wetland habitat throughout Hong Kong	Common passage migrant and winter visitor	
大白鷺	Great Egret	<i>Ardea alba</i>	1			35	48	3	Regional Concern (Fellowes et al. 2002)	Widely distributed in Hong Kong	Common resident and winter visitor	
蒼鷺	Grey Heron	<i>Ardea cinerea</i>				1	1	2	Potential Regional Concern (Fellowes et al. 2002)	Found in Deep Bay area, Starling Inlet, Kowloon Park, Cape D'Aguiar	Common winter visitor	
池鷺	Chinese Pond Heron	<i>Ardeola bacchus</i>			2		1	1	Regional Concern (Fellowes et al. 2002)	Widely distributed in Hong Kong	Common resident	
褐翅鴉鶻	Greater Coucal	<i>Centropus sinensis</i>			2				Vulnerable (China Red Data Book Status)	Widely distributed in Hong Kong	Common resident	
原鴿	Domestic Pigeon	<i>Columba livia</i>	4						-	Widely distributed in urban area throughout Hong Kong	Common resident	
鵲鴝	Oriental Magpie Robin	<i>Copsychus saularis</i>	4	1				1	-	Widely distributed in Hong Kong	Abundant resident	
家鴉	House Crow	<i>Corvus splendens</i>	8	14	8				-	Distributed in some urban areas	Resident	
白頸鴉	Collared Crow	<i>Corvus torquatus</i>						1	Local Concern (Fellowes et al. 2002); Near Threatened (IUCN Red List)	Found in Inner Deep Bay area, Nam Chung, Kei Ling Ha, Tai Mei Tuk, Pok Fu Lam, Chek lap Kok, Shuen Wan, Lam Tsuen	Uncommon resident	
小白鷺	Little Egret	<i>Egretta garzetta</i>	1			5	35	5	Regional Concern (Fellowes et al. 2002)	Widely distributed in coastal area throughout Hong Kong	Common resident	
噪鶻	Common Koel	<i>Eudynamys scolopaceus</i>	2						-	Widely distributed in Hong Kong	Common resident	
黑領棕鳥	Black-collared Starling	<i>Gracupica nigricollis</i>	33	2	1				-	Widely distributed in Hong Kong	Common resident	Building Nest on <i>Roystonea regia</i> in Developed Area
白胸翡翠	White-throated Kingfisher	<i>Halcyon smyrnensis</i>				1	1		Local Concern (Fellowes et al. 2002)	Widely distributed in coastal areas throughout Hong Kong	Common resident	
家燕	Barn Swallow	<i>Hirundo rustica</i>	5		1				-	Widely distributed in Hong Kong	Abundant passage migrant and summer visitor	
棕背伯勞	Long-tailed Shrike	<i>Lanius schach</i>			2				-	Widely distributed in open areas throughout Hong Kong	Common resident	
黑鳶	Black Kite	<i>Milvus migrans</i>	6	2	23	1		1	Cap. 586; & Regional Concern (Fellowes et al. 2002)	Widely distributed in Hong Kong	Common resident and winter visitor	

Appendix 10.2 - Species List (Fauna)

Chinese Name	Common Name	Species Name	Habitat						Conservation status	Distribution	Rarity	Remarks	
			Developed Area	Construction Site	Abandoned Land	Watercourse	Artificial Coastline	Marine					
Avifauna													
白鵲鴿	White Wagtail	<i>Motacilla alba</i>	6	7	1				-	Widely distributed in Hong Kong	Common passage migrant and winter visitor		
夜鷺	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	18					7	4	Local Concern (Fellowes et al. 2002)	Widely distributed in Hong Kong	Common resident and winter visitor	Immature individuals were found in Developed Area and Artificial Coastline
長尾縫葉鶯	Common Tailorbird	<i>Orthotomus sutorius</i>			1					-	Widely distributed in Hong Kong	Common resident	
大山雀	Great Tit	<i>Parus cinereus</i>	1		1					-	Widely distributed in Hong Kong	Common resident	
樹麻雀	Eurasian Tree Sparrow	<i>Passer montanus</i>	90	170	10					-	Widely distributed in Hong Kong	Abundant resident	Immature individuals were found in Developed Area
普通鸕鶿	Great Cormorant	<i>Phalacrocorax carbo</i>							14	Potential Regional Concern (Fellowes et al. 2002)	Widely distributed in coastal areas throughout Hong Kong	Common winter visitor	
北紅尾鸚	Daurian Redstart	<i>Phoenicurus auroreus</i>		1						-	Widely distributed in Hong Kong	Common winter visitor	
黃眉柳鶯	Yellow-browed Warbler	<i>Phylloscopus inornatus</i>			1					-	Widely distributed in woodland throughout Hong Kong	Common winter visitor and spring migrant	
喜鵲	Eurasian Magpie	<i>Pica pica</i>	2				1			-	Widely distributed in Hong Kong	Common resident	
褐頭鷓鴣	Plain Prinia	<i>Prinia inornata</i>	1		2					-	Widely distributed in grassland throughout Hong Kong	Common resident	
紅耳鸚	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	27	3						-	Widely distributed in Hong Kong	Abundant resident	Immature individuals were found in Developed Area
白頭鸚	Chinese Bulbul	<i>Pycnonotus sinensis</i>	4	1	2					-	Widely distributed in Hong Kong	Abundant resident	
黑喉石(即鳥)	Stejneger's Stonechat	<i>Saxicola stejnegeri</i>	1							-	Widely distributed in open cultivated fields throughout Hong Kong	Common passage migrant and winter visitor	
珠頸斑鳩	Spotted Dove	<i>Spilopelia chinensis</i>	23	3	2			1		-	Widely distributed in Hong Kong	Abundant resident	
暗綠繡眼鳥	Japanese White-eye	<i>Zosterops japonicus</i>	8							-	Widely distributed in Hong Kong	Abundant resident	
* All birds are Listed in Wild Animals Protection Ordinance (Cap. 170)													
Terrestrial Mammal													
小家鼠	House Mouse	<i>Mus musculus</i>	1							-	Widely distributed in urban areas associated with human activity	-	
褐家鼠	Brown Rat	<i>Rattus norvegicus</i>	2	1						-	Widely distributed in urban areas associated with human activity	-	
Butterfly													
梨花遷粉蝶	Mottled Emigrant	<i>Catopsilia pyranthe pyranthe</i>	1							-	Widely distributed throughout Hong Kong	Very Common	
斑鳳蝶	Common Mime	<i>Chilasa clytia clytia</i>			1					-	Widely distributed throughout Hong Kong	Common	
報喜斑粉蝶	Red-base Jezebel	<i>Delias pasithoe pasithoe</i>			2					-	Widely distributed throughout Hong Kong	Very Common	
黃粉蝶屬	Grass Yellow	<i>Eurema sp.</i>		1						-	-	-	
幻紫斑蛺蝶	Great Egg-fly	<i>Hypolimnas bolina kezia</i>			1					-	Widely distributed throughout Hong Kong	Common	
玉帶鳳蝶	Common Mormon	<i>Papilio polytes polytes</i>	1							-	Widely distributed throughout Hong Kong	Very Common	

Appendix 10.2 - Species List (Fauna)

Chinese Name	Common Name	Species Name	Habitat						Conservation status	Distribution	Rarity	Remarks
			Developed Area	Construction Site	Abandoned Land	Watercourse	Artificial Coastline	Marine				
Butterfly												
東方菜粉蝶	Indian Cabbage White	<i>Pieris canidia canidia</i>	2		1				-	Widely distributed throughout Hong Kong	Very Common	
酢醬灰蝶	Pale Grass Blue	<i>Pseudozizeeria maha serica</i>	22		2				-	Widely distributed throughout Hong Kong	Very Common	
Odonate												
紋藍小蜻	Blue Percher	<i>Diplacodes trivialis</i>		3					-	Widespread, especially in late summer, when it can be found almost everywhere in Hong Kong	Abundant	
狹腹灰蜻	Green Skimmer	<i>Orthetrum sabina sabina</i>	1	2					-	Widely distribute in all wetland habitats throughout Hong Kong	Abundant	
黃蜻	Wandering Glider	<i>Pantala flavescens</i>	2		2				-	Widely distribute in all wetland habitats throughout Hong Kong	Abundant	
* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum												
Fish												
鰱 (烏頭)	Grey mullet	<i>Mugil cephalus</i>				5			-	Widespread in estuaries and marine environment in Hong Kong	Common	
* Species listed as "Least Concern" in IUCN Red List was not shown in the Conservation Status coloum												

Appendix 10.3

**Photographic Record of Species with
Conservation Importance**



Ardea alba
(Taken in Mar 2015)



Ardea cinerea
(Taken in Mar 2015)



Egretta garzetta
(Taken in Mar 2015)



Milvus migrans
(Taken in Mar 2015)



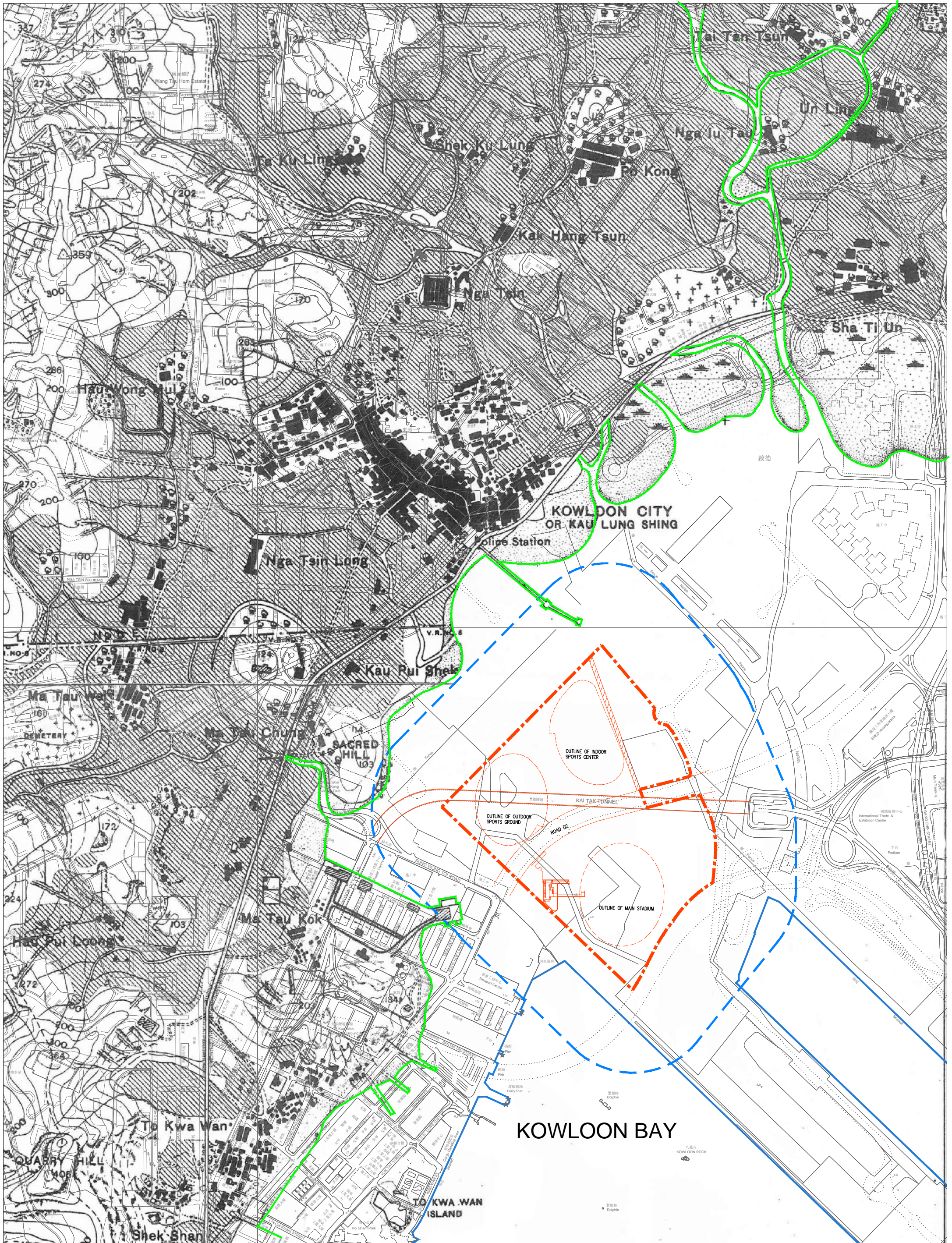
Nycticorax nycticorax
(Taken in Mar 2015)

Appendix 10.3

Photographic Record of Species with Conservation Importance





Appendix 11A

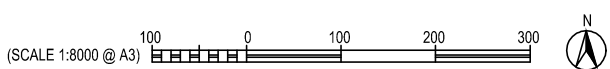
**Overlaying Layout Plan 2014 on 1904
Survey Map**



APPENDIX 11A: OVERLAYING LAYOUT PLAN 2014 ON 1904 SURVEY MAP

LEGEND

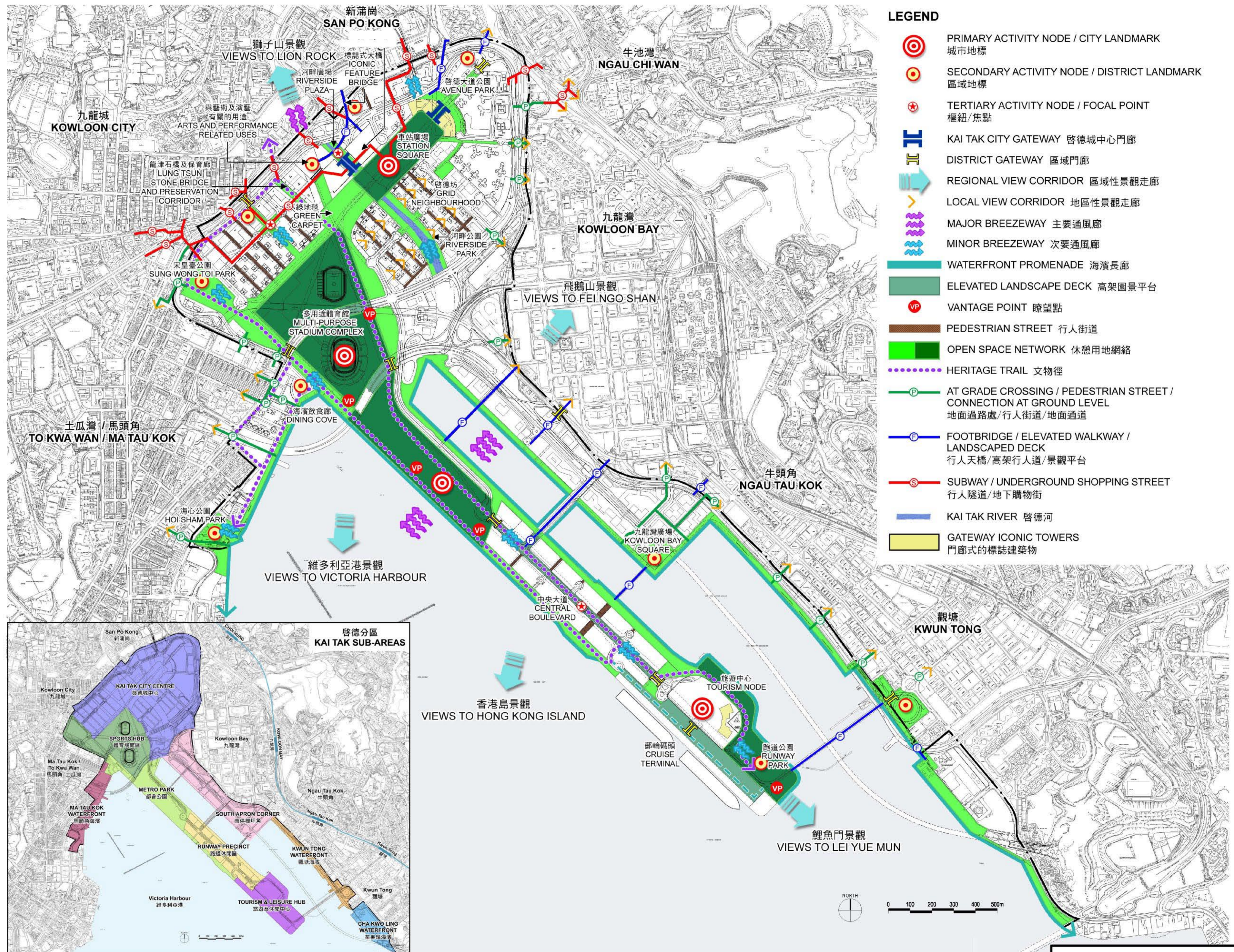
-  SHORE LINE AS AT 1904
-  MPSC BOUNDARY
-  EXISTING SHORE LINE
-  CHIA ASSESSMENT AREA(200M)



SOURCE: LION HILL, SHEET NO.8 FOR WAR DEPARTMENT PURPOSES ONLY
 AUTHOR: GREAT BRITAIN ORDNANCE SURVEY
 PUBLICATION: SOUTHAMPTON : PRINTED AT THE ORDNANCE SURVEY OFFICE 1904

Appendix 11B

Urban Design Framework



城市設計大綱 URBAN DESIGN FRAMEWORK

圖 FIGURE 2

(顯示初步構思，只供參考) (FOR ILLUSTRATION PURPOSE ONLY)

Appendix 11C

**Vantage Points Proposed in the study on
Urban Design Guidelines for Hong Kong**



Appendix 11D

Detail of Broad Brush Tree Groups

Broad Brush Tree Survey within 500m boundary from proposed Multi-purpose Sports Complex in Kai Tak

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
1	石栗 細葉榕	<i>Aleurites moluccana</i> <i>Ficus microcarpa</i>	3	20 to 60	10	6 to 20	Mature	
2	樟	<i>Cinnamomum camphora</i>	5	20 to 30	9 to 10	6 to 8	Immature	
3	鳳凰木 血桐 苦楝 白蘭 桑 側柏 番石榴	<i>Delonix regia</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Melia azedarach</i> <i>Michelia x alba</i> <i>Morus alba</i> <i>Platycladus orientalis</i> <i>Psidium guajava</i>	15	15 to 30	5 to 10	6 to 10	Immature to mature	
4	台灣相思 秋楓 血桐 苦楝	<i>Acacia confusa</i> <i>Bischofia javanica</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Melia azedarach</i>	26	15 to 40	5 to 8	6 to 10	Immature to mature	
5	台灣相思 羊蹄甲屬 木棉 散尾葵 桉樹 細葉榕 大花紫薇 蒲葵 日本葵 雞蛋花 蒲桃 小葉欖仁	<i>Acacia confusa</i> <i>Bauhinia</i> sp. <i>Bombax ceiba</i> <i>Dypsis lutescens</i> <i>Eucalyptus</i> sp. <i>Ficus microcarpa</i> <i>Lagerstroemia speciosa</i> <i>Livistona chinensis</i> <i>Phoenix roebelenii</i> <i>Plumeria rubra</i> <i>Syzygium jambos</i> <i>Terminalia mantaly</i>	72	10 to 30	4 to 15	2 to 12	Immature to mature	
6	木棉 朴樹 對葉榕 血桐	<i>Bombax ceiba</i> <i>Celtis sinensis</i> <i>Ficus hispida</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i>	11	20 to 40	6 to 8	3 to 8	Immature to mature	
7	異葉南洋杉 宮粉羊蹄甲 番木瓜 木麻黃 鳳凰木 細葉榕 蒲葵 血桐 杧果 日本葵 番石榴	<i>Araucaria heterophylla</i> <i>Bauhinia variegata</i> <i>Carica papaya</i> <i>Casuarina equisetifolia</i> <i>Delonix regia</i> <i>Ficus microcarpa</i> <i>Livistona chinensis</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Mangifera indica</i> <i>Phoenix roebelenii</i> <i>Psidium guajava</i>	23	10 to 50	4 to 16	2 to 10	Immature to mature	

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
8	木棉 大葉榕 血桐	<i>Bombax ceiba</i> <i>Ficus virens</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i>	7	20 to 30	6 to 8	5	Immature to mature	
9	常綠臭椿 大葉合歡 異葉南洋杉 假檳榔 秋楓 木棉 木麻黃 龍眼 高山榕 垂葉榕 筆管榕 大葉榕 蒲葵 白千層 日本葵 王棕 大絲葵	<i>Ailanthus fordii</i> <i>Albizia lebbbeck</i> <i>Araucaria heterophylla</i> <i>Archontophoenix alexandrae</i> <i>Bischofia javanica</i> <i>Bombax ceiba</i> <i>Casuarina equisetifolia</i> <i>Dimocarpus longan</i> <i>Ficus altissima</i> <i>Ficus benjamina</i> <i>Ficus subpisocarpa</i> <i>Ficus virens</i> <i>Livistona chinensis</i> <i>Melaleuca cajuputi</i> subsp. <i>Cumingiana</i> <i>Phoenix roebelenii</i> <i>Roystonea regia</i> <i>Washingtonia robust</i>	78	10 to 40	3 to 15	2 to 7	Immature to mature	
10	石栗 羊蹄甲屬 洋紫荊 串錢柳	<i>Aleurites moluccana</i> <i>Bauhinia</i> sp. <i>Bauhinia</i> x <i>blakeana</i> <i>Callistemon viminalis</i>	19	15 to 30	4 to 7	4 to 6	Immature to mature	
11	台灣相思 石栗 羊蹄甲屬 宮粉羊蹄甲 洋紫荊 白千層 白蘭 雞蛋花	<i>Acacia confusa</i> <i>Aleurites moluccana</i> <i>Bauhinia</i> sp. <i>Bauhinia variegata</i> <i>Bauhinia</i> x <i>blakeana</i> <i>Melaleuca cajuputi</i> subsp. <i>Cumingiana</i> <i>Michelia</i> x <i>alba</i> <i>Plumeria rubra</i>	49	15 to 40	3 to 7	4 to 6	Immature to mature	
12	日本葵 王棕 黃槐	<i>Phoenix roebelenii</i> <i>Roystonea regia</i> <i>Senna surattensis</i>	13	10 to 40	3 to 14	4 to 6	Immature to mature	

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
13	常綠臭椿 大葉合歡 石栗 羊蹄甲屬 白花洋紫荊 宮粉羊蹄甲 土蜜樹 朴樹 龍眼 細葉榕 筆管榕 大葉榕 山指甲 血桐 番石榴 假蘋婆	<i>Ailanthus fordii</i> <i>Albizia lebbbeck</i> <i>Aleurites moluccana</i> <i>Bauhinia</i> sp. <i>Bauhinia variegata</i> var. <i>candida</i> <i>Bauhinia variegata</i> <i>Bridelia tomentosa</i> <i>Celtis sinensis</i> <i>Dimocarpus longan</i> <i>Ficus microcarpa</i> <i>Ficus subpisocarpa</i> <i>Ficus virens</i> <i>Ligustrum sinense</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Psidium guajava</i> <i>Sterculia lanceolata</i>	50	10 to 40	4 to 10	4 to 20	Immature to mature	
14	朴樹 龍眼 細葉榕 菩提樹 筆管榕 銀合歡 荔枝 血桐 杧果 番石榴 安石榴	<i>Celtis sinensis</i> <i>Dimocarpus longan</i> <i>Ficus microcarpa</i> <i>Ficus religiosa</i> <i>Ficus subpisocarpa</i> <i>Leucaena leucocephala</i> <i>Litchi chinensis</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Mangifera indica</i> <i>Psidium guajava</i> <i>Punica granatum</i>	92	20 to 50	6 to 10	4 to 8	Immature to mature	
15	朴樹 筆管榕 銀合歡	<i>Celtis sinensis</i> <i>Ficus subpisocarpa</i> <i>Leucaena leucocephala</i>	3	15 to 25	4 to 6	3 to 5	Immature	
16	石栗 細葉榕 宮粉羊蹄甲 小魚尾葵 樹頭菜 紅邊鐵樹 散尾葵 細葉榕 日本葵	<i>Aleurites moluccana</i> <i>Ficus microcarpa</i> <i>Bauhinia variegata</i> <i>Caryota mitis</i> <i>Crateva unilocularis</i> <i>Dracaena marginata</i> <i>Dypsis lutescens</i> <i>Ficus microcarpa</i> <i>Phoenix roebelenii</i>	29	10 to 60	3 to 12	2 to 23	Immature to mature	
17	耳果相思 大葉合歡 陰香 樹頭菜 海南紅豆 黃槐 小葉欖仁	<i>Acacia auriculiformis</i> <i>Albizia lebbbeck</i> <i>Cinnamomum burmannii</i> <i>Crateva unilocularis</i> <i>Ormosia pinnata</i> <i>Senna surattensis</i> <i>Terminalia mantaly</i>	10	10 to 40	6 to 12	4 to 14	Immature to mature	

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
18	洋紫荊	<i>Bauhinia x blakeana</i>	13	15 to 25	5 to 8	3 to 6	Immature to mature	
19	白千層	<i>Melaleuca cajuputi</i> subsp. <i>Cumingiana</i>	4	20 to 30	8	4 to 6	Immature	
20	石栗 小魚尾葵 白千層	<i>Aleurites moluccana</i> <i>Caryota mitis</i> <i>Melaleuca cajuputi</i> subsp. <i>cumingiana</i>	53	15 to 30	3 to 8	2 to 8	Immature to mature	
21	台灣相思 大葉合歡 石栗 羊蹄甲屬 洋紫荊 朴樹 鳳凰木 黃槿 潺槁樹 黃槐	<i>Acacia confusa</i> <i>Albizia lebbbeck</i> <i>Aleurites moluccana</i> <i>Bauhinia</i> sp. <i>Bauhinia x blakeana</i> <i>Celtis sinensis</i> <i>Delonix regia</i> <i>Hibiscus tiliaceus</i> <i>Litsea glutinosa</i> <i>Senna surattensis</i>	54	10 to 30	4 to 10	4 to 10	Immature to mature	
22	台灣相思 大葉合歡 洋紫荊 木麻黃 朴樹 銀合歡 血桐 苦楝 黃花夾竹桃	<i>Acacia confusa</i> <i>Albizia lebbbeck</i> <i>Bauhinia x blakeana</i> <i>Casuarina equisetifolia</i> <i>Celtis sinensis</i> <i>Leucaena leucocephala</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Melia azedarach</i> <i>Thevetia peruviana</i>	30	10 to 25	4 to 10	4 to 10	Immature to mature	
23	細葉榕 銀合歡 血桐	<i>Ficus microcarpa</i> <i>Leucaena leucocephala</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i>	4	15 to 25	5 to 7	4 to 6	Immature	
24	菠蘿蜜 木棉 細葉榕 銀合歡 杧果	<i>Artocarpus heterophyllus</i> <i>Bombax ceiba</i> <i>Ficus microcarpa</i> <i>Leucaena leucocephala</i> <i>Mangifera indica</i>	10	20 to 60	6 to 8	6 to 8	Immature to mature	
25	木麻黃	<i>Casuarina equisetifolia</i>	50	15 to 25	8 to 12	4 to 8	Immature to mature	
26	羊蹄甲屬 洋紫荊	<i>Bauhinia</i> sp. <i>Bauhinia x blakeana</i>	2	15 to 20	5 to 6	3 to 5	Immature	
27	黃槐	<i>Senna surattensis</i>	26	10 to 20	4 to 8	4 to 6	Immature to mature	
28	洋紫荊 秋楓 龍柏 白千層	<i>Bauhinia x blakeana</i> <i>Bischofia javanica</i> <i>Juniperus chinensis</i> <i>Melaleuca cajuputi</i> subsp. <i>cumingiana</i>	10	10 to 25	4 to 8	4 to 6	Immature to mature	
29	日本葵 雞蛋花	<i>Phoenix roebelenii</i> <i>Plumeria rubra</i>	13	10 to 20	3	1 to 3	Immature	
30	蒲葵	<i>Livistona chinensis</i>	17	15 to 25	3 to 5	2 to 4	Immature	

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
31	台灣相思 宮粉羊蹄甲 木棉 紅千層 小魚尾葵 朴樹 散尾葵 水石榕 桉樹 印度榕 對葉榕 細葉榕 複羽葉欒樹 大花紫薇 蒲葵 血桐 白千層 苦楝 桑 日本葵 火焰木 假蘋婆 大絲葵	<i>Acacia confusa</i> <i>Bauhinia variegata</i> <i>Bombax ceiba</i> <i>Callistemon rigidus</i> <i>Caryota mitis</i> <i>Celtis sinensis</i> <i>Dyopsis lutescens</i> <i>Elaeocarpus hainanensis</i> <i>Eucalyptus</i> sp. <i>Ficus elastica</i> <i>Ficus hispida</i> <i>Ficus microcarpa</i> <i>Koelreuteria bipinnata</i> <i>Lagerstroemia speciosa</i> <i>Livistona chinensis</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Melaleuca cajuputi</i> subsp. <i>Cumingiana</i> <i>Melia azedarach</i> <i>Morus alba</i> <i>Phoenix roebelenii</i> <i>Spathodea campanulata</i> <i>Sterculia lanceolata</i> <i>Washingtonia robust</i>	109	10 to 35	4 to 15	4 to 20	Immature to mature	
32	常綠臭椿 龍柏	<i>Ailanthus fordii</i> <i>Juniperus chinensis</i>	5	10 to 30	4 to 10	2 to 6	Immature to mature	
33	秋楓	<i>Bischofia javanica</i>	12	10	4 to 6	2 to 4	Immature	
34	木棉 細葉榕 筆管榕 大葉榕 苦楝	<i>Bombax ceiba</i> <i>Ficus microcarpa</i> <i>Ficus subpisocarpa</i> <i>Ficus virens</i> <i>Melia azedarach</i>	6	20 to 35	8 to 14	8 to 15	Mature	
35	細葉榕 蒲桃	<i>Ficus microcarpa</i> <i>Syzygium jambos</i>	2	30 to 35	6 to 8	12	Mature	
36	石栗 假檳榔 宮粉羊蹄甲 小魚尾葵	<i>Aleurites moluccana</i> <i>Archontophoenix alexandrae</i> <i>Bauhinia variegata</i> <i>Caryota mitis</i>	15	15 to 25	3 to 8	2 to 8	Immature to mature	
37	洋紫荊 木麻黃	<i>Bauhinia x blakeana</i> <i>Casuarina equisetifolia</i>	11	15 to 30	7 to 15	2 to 7	Immature to mature	

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
38	大葉合歡	<i>Albizia lebbbeck</i>	122	10 to 100	4 to 20	4 to 25	Immature to mature	One potentially registrable tree: <i>Albizia lebbbeck</i> (DBH => 1m, Spread => 25m)
	石栗	<i>Aleurites moluccana</i>						
	假檳榔	<i>Archontophoenix alexandrae</i>						
	宮粉羊蹄甲	<i>Bauhinia variegata</i>						
	洋紫荊	<i>Bauhinia x blakeana</i>						
	木棉	<i>Bombax ceiba</i>						
	木麻黃	<i>Casuarina equisetifolia</i>						
	陰香	<i>Cinnamomum burmannii</i>						
	樟	<i>Cinnamomum camphora</i>						
	樹頭菜	<i>Crateva unilocularis</i>						
	鳳凰木	<i>Delonix regia</i>						
	垂葉榕	<i>Ficus benjamina</i>						
	細葉榕	<i>Ficus microcarpa</i>						
	大葉榕	<i>Ficus virens</i>						
	大花紫薇	<i>Lagerstroemia speciosa</i>						
	蒲葵	<i>Livistona chinensis</i>						
	苦楝	<i>Melia azedarach</i>						
	白蘭	<i>Michelia x alba</i>						
日本葵	<i>Phoenix roebelenii</i>							
王棕	<i>Roystonea regia</i>							
假蘋婆	<i>Sterculia lanceolata</i>							
紅花風鈴木	<i>Tabebuia rosea</i>							
大絲葵	<i>Washingtonia robust</i>							
39	木棉	<i>Bombax ceiba</i>	4	20 to 30	10 to 12	8	Mature	
40	樹頭菜	<i>Crateva unilocularis</i>	8	20 to 40	6 to 12	6 to 12	Mature	
	鳳凰木	<i>Delonix regia</i>						
	大葉榕	<i>Ficus virens</i>						
	蒲葵	<i>Livistona chinensis</i>						
41	木棉	<i>Bombax ceiba</i>	1	45	12	10	Mature	
42	樹頭菜	<i>Crateva unilocularis</i>	12	10 to 20	3 to 8	3 to 6	Immature	
	蒲葵	<i>Livistona chinensis</i>						
	狐尾椰子	<i>Wodyetia bifurcata</i>						
43	朴樹	<i>Celtis sinensis</i>	7	15 to 25	4 to 8	3 to 6	Mature	
	蒲葵	<i>Livistona chinensis</i>						
	日本葵	<i>Phoenix roebelenii</i>						

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
44	小葉米仔蘭 羊蹄甲屬 秋楓 番木瓜 小魚尾葵 朴樹 樹頭菜 細葉榕 菩提樹 大葉榕 銀合歡 山指甲 血桐 桑 番石榴 蒲桃	<i>Aglaia odorata</i> var. <i>microphyllina</i> <i>Bauhinia</i> sp. <i>Bischofia javanica</i> <i>Carica papaya</i> <i>Caryota mitis</i> <i>Celtis sinensis</i> <i>Crateva unilocularis</i> <i>Ficus microcarpa</i> <i>Ficus religiosa</i> <i>Ficus virens</i> <i>Leucaena leucocephala</i> <i>Ligustrum sinense</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Morus alba</i> <i>Psidium guajava</i> <i>Syzygium jambos</i>	53	15 to 30	3 to 10	3 to 8	Immature to mature	
45	異葉南洋杉 假檳榔 羊蹄甲屬 洋紫荊 木棉 串錢柳 木麻黃 細葉榕 大花紫薇 蒲葵 白千層 日本葵 雞蛋花 王棕	<i>Araucaria heterophylla</i> <i>Archontophoenix alexandrae</i> <i>Bauhinia</i> sp. <i>Bauhinia</i> x <i>blakeana</i> <i>Bombax ceiba</i> <i>Callistemon viminalis</i> <i>Casuarina equisetifolia</i> <i>Ficus microcarpa</i> <i>Lagerstroemia speciosa</i> <i>Livistona chinensis</i> <i>Melaleuca cajuputi</i> subsp. <i>Cumingiana</i> <i>Phoenix roebelenii</i> <i>Plumeria rubra</i> <i>Roystonea regia</i>	100	20 to 30	6 to 13	2 to 4	Immature to mature	
46	秋楓 木棉 細葉榕 大葉榕	<i>Bischofia javanica</i> <i>Bombax ceiba</i> <i>Ficus microcarpa</i> <i>Ficus virens</i>	4	15 to 25	3 to 8	3 to 10	Immature to mature	

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
47	台灣相思 木麻黃	<i>Acacia confusa</i> <i>Casuarina equisetifolia</i>	31	10 to 30	3 to 14	4 to 10	Immature to mature	
48	木麻黃 銀合歡	<i>Casuarina equisetifolia</i> <i>Leucaena leucocephala</i>	10	10 to 25	5 to 12	3 to 8	Immature to mature	
49	木麻黃	<i>Casuarina equisetifolia</i>	7	10 to 20	6 to 10	4 to 8	Immature to mature	
50	木麻黃 銀合歡	<i>Casuarina equisetifolia</i> <i>Leucaena leucocephala</i>	5	10 to 20	6 to 10	4 to 6	Immature to mature	
51	銀合歡	<i>Leucaena leucocephala</i>	1	15	6	5	Immature	
52	銀合歡	<i>Leucaena leucocephala</i>	100	10 to 15	4 to 8	3 to 6	Immature	
53	台灣相思 大葉合歡 菠蘿蜜 朴樹 細葉榕 筆管榕 大葉榕 黃槿 銀合歡 血桐 苦楝 桑 欖仁樹 黃花夾竹桃	<i>Acacia confusa</i> <i>Albizia lebbeck</i> <i>Artocarpus heterophyllus</i> <i>Celtis sinensis</i> <i>Ficus microcarpa</i> <i>Ficus subpisocarpa</i> <i>Ficus virens</i> <i>Hibiscus tiliaceus</i> <i>Leucaena leucocephala</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Melia azedarach</i> <i>Morus alba</i> <i>Terminalia catappa</i> <i>Thevetia peruviana</i>	102	10 to 25	2 to 10	2 to 10	Immature to mature	
54	大葉合歡 細葉榕 銀合歡 血桐	<i>Albizia lebbeck</i> <i>Ficus microcarpa</i> <i>Leucaena leucocephala</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i>	11	15 to 25	2 to 9	2 to 8	Immature to mature	
55	木棉 朴樹 銀合歡 血桐 苦楝	<i>Bombax ceiba</i> <i>Celtis sinensis</i> <i>Leucaena leucocephala</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Melia azedarach</i>	40	10 to 20	4 to 8	4 to 8	Immature to mature	
56	耳果相思	<i>Acacia auriculiformis</i>	1	20	8	8	Immature	
57	石栗 木棉 木麻黃 菩提樹 銀合歡	<i>Aleurites moluccana</i> <i>Bombax ceiba</i> <i>Casuarina equisetifolia</i> <i>Ficus religiosa</i> <i>Leucaena leucocephala</i>	112	10 to 25	6 to 14	3 to 8	Immature to mature	

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
58	台灣相思 秋楓 木棉 朴樹 細葉榕 銀合歡 血桐 桑 南美假櫻桃 番石榴	<i>Acacia confusa</i> <i>Bischofia javanica</i> <i>Bombax ceiba</i> <i>Celtis sinensis</i> <i>Ficus microcarpa</i> <i>Leucaena leucocephala</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i> <i>Morus alba</i> <i>Muntingia calabura</i> <i>Psidium guajava</i>	30	10 to 25	5 to 8	4 to 8	Immature to mature	
59	木棉 番木瓜 朴樹 細葉榕 青果榕	<i>Bombax ceiba</i> <i>Carica papaya</i> <i>Celtis sinensis</i> <i>Ficus microcarpa</i> <i>Ficus variegata</i>	17	15 to 25	4 to 12	4 to 10	Immature to mature	
60	細葉榕 菩提樹 鐵刀木	<i>Ficus microcarpa</i> <i>Ficus religiosa</i> <i>Senna siamea</i>	9	10 to 25	4 to 10	4 to 8	Immature to mature	
61	假檳榔 蒲葵 日本葵	<i>Archontophoenix alexandrae</i> <i>Livistona chinensis</i> <i>Phoenix roebelenii</i>	100	15 to 25	7 to 12	2 to 4	Mature	
62	台灣相思 假檳榔 鳳凰木 細葉榕 蒲葵 鐵刀木	<i>Acacia confusa</i> <i>Archontophoenix alexandrae</i> <i>Delonix regia</i> <i>Ficus microcarpa</i> <i>Livistona chinensis</i> <i>Senna siamea</i>	15	15 to 20	4 to 6	2 to 6	Immature	
63	台灣相思 銀合歡	<i>Acacia confusa</i> <i>Leucaena leucocephala</i>	41	10 to 20	4 to 6	4	Immature	
64	台灣相思 秋楓 木棉	<i>Acacia confusa</i> <i>Bischofia javanica</i> <i>Bombax ceiba</i>	5	15 to 25	4 to 9	4 to 10	Immature to mature	
65	細葉榕 筆管榕 大葉榕	<i>Ficus microcarpa</i> <i>Ficus subpisocarpa</i> <i>Ficus virens</i>	5	15 to 25	4 to 8	4 to 6	Immature	

Tree Group	Species		Approx. No.	DBH (cm)	Height (m)	Crown Spread (m)	Maturity	Remarks
	Chinese Name	Species Name						
66	朴樹 銀合歡 苦楝 桑	<i>Celtis sinensis</i> <i>Leucaena leucocephala</i> <i>Melia azedarach</i> <i>Morus alba</i>	22	10 to 20	6 to 8	5 to 8	Immature	
67	桑 朴樹 銀合歡 黃槿	<i>Morus alba</i> <i>Celtis sinensis</i> <i>Leucaena leucocephala</i> <i>Hibiscus tiliaceus</i>	100	10 to 20	4 to 8	4 to 6	Immature	
68	木棉 木麻黃 銀合歡 血桐	<i>Bombax ceiba</i> <i>Casuarina equisetifolia</i> <i>Leucaena leucocephala</i> <i>Macaranga tanarius</i> var. <i>tomentosa</i>	11	10 to 20	4 to 8	4 to 8	Immature	
69	木麻黃	<i>Casuarina equisetifolia</i>	10	15 to 20	6 to 10	6 to 8	Immature to mature	
70	假檳榔 蒲葵	<i>Archontophoenix alexandrae</i> <i>Livistona chinensis</i>	10	10 to 15	3 to 6	2 to 4	Immature	
71	木棉	<i>Bombax ceiba</i>	1	20	5	4	Immature	
72	木棉 刺桐屬	<i>Bombax ceiba</i> <i>Erythrina</i> sp.	3	15 to 25	5 to 8	5 to 8	Immature	
73	常綠臭椿	<i>Ailanthus fordii</i>	8	20 to 35	8 to 12	4 to 6	Mature	

Tree Group	Species		Approx. No.	DBH (mm)	Height (m)	Crown Spread (m)	Maturity	Survival rate after transplanting	Total DBH (Assumed Max. DBH) (mm)	
	Botanical Name	Chinese Name								
TG46	<i>Bischofia javanica</i>	秋楓	1	150 - 250	3 - 8	3 - 10	Immature to mature	Med	250 x 4	1000
	<i>Bombax ceiba</i>	木棉	1					Med		
	<i>Ficus microcarpa</i>	細葉榕	1					Med		
	<i>Ficus virens</i>	大葉榕	1					Med		
TG47	<i>Acacia confusa</i>	台灣相思	16 (Assumed to be in proposition in TG47)	100 - 300	3 - 14	4 - 10	Immature to mature	Low	300 x 31	9300
			15 (Assumed to be in proposition in TG47)					Low		
TG48	<i>Casuarina equisetifolia</i>	木麻黃	5 (Assumed to be in 50% of Trees in TG48)	100 - 250	5 - 12	3 - 8	Immature to mature	Low	250 x 5	1250
	<i>Leucaena leucocephala</i>	銀合歡	5 (Assumed to be in 50% of Trees in TG48)					Low (Note 1)		
TG49	<i>Casuarina equisetifolia</i>	木麻黃	7	100 - 200	6 - 10	4 - 8	Immature to mature	Low	200 x 7	1400
TG50	<i>Casuarina equisetifolia</i>	木麻黃	2 (Assumed to be in proposition in TG50)	100 - 200	6 - 10	4 - 6	Immature to mature	Low	200 x 2	400
			3 (Assumed to be in proposition in TG50)					Low (Note 1)		
TG51	<i>Leucaena leucocephala</i>	銀合歡	1	150	6	5	Immature	Low (Note 1)	150 x 1	150
TG52	<i>Leucaena leucocephala</i>	銀合歡	100	100 - 150	4 - 8	3 - 6	Immature	Low (Note 1)	150 x 100	15000
TG71	<i>Bombax ceiba</i>	木棉	1	200	5	4	Immature	Med	200 x 1	200
										30550

NOTES:

1. *Undesirable Species not worthy of transplanting.*

2. *Compensatory trees to be of 90mm DBH*

Option 1:		
All tree groups to be felled		
Total numbers of trees:	159	
Numbers of trees to be retained:	0	
Numbers of trees of undesirable species (<i>Leucaena leucocephala</i>) to be felled:	109	
Numbers of trees (others) to be felled:	50	
Total DBH of felled trees (Maximum):	30,550mm	

Summary of Compensatory Planting (Note)		
Number of 90mm DBH tree plantings to compensate the loss at 1:1 ratio in terms of Quantity (Number)		159 nos.
Additional Number of 90mm DBH tree plantings to compensate the loss at 1:1 ratio in term of Quality (Aggregated DBH)	(30550/90) -159 =	181 nos.
Compensatory Tree Numbers to be provided within the Site to meet 1:1 ratio in terms of both Quantity (Number) and Quality (Aggregated DBH)		340 nos.

NOTE:

Provision of compensatory planting follows the requirements in Development Bureau Technical Circular (Works) No. 7/2015 - Tree Preservation.

Potential Tree Species for Transplantation

Species		Survival rate after transplanting	Approx. No.	Potential for Transplantation
Botanical Name	Chinese Name			
<i>Bischofia javanica</i>	秋楓	Med	1	Yes
<i>Bombax ceiba</i>	木棉	Med	2	Yes
<i>Ficus microcarpa</i>	細葉榕	Med	1	Yes
<i>Ficus virens</i>	大葉榕	Med	1	Yes
<i>Acacia confusa</i>	台灣相思	Low	16	-
<i>Casuarina equisetifolia</i>	木麻黃	Low	29	-
<i>Leucaena leucocephala</i>	銀合歡	Low	109	Note 1

NOTES:

1. Undesirable species not worthy of transplanting
2. Number of trees with potential for transplanting to be reviewed with updated tree survey results by others

Appendix 11E

**A Broad Tree Survey within the 500m
Study Boundary**



LEGEND:

- Project Site
- 500m Study Area
- Tree Group
- Potentially Registrable Tree

SCALE	AS SHOWN	DATE	Mar 15
CHECK	B.C.	DRAWN	L.H.T.
JOB No.	IA14016	DRAWING No.	-
		REV	-

Appendix 11F

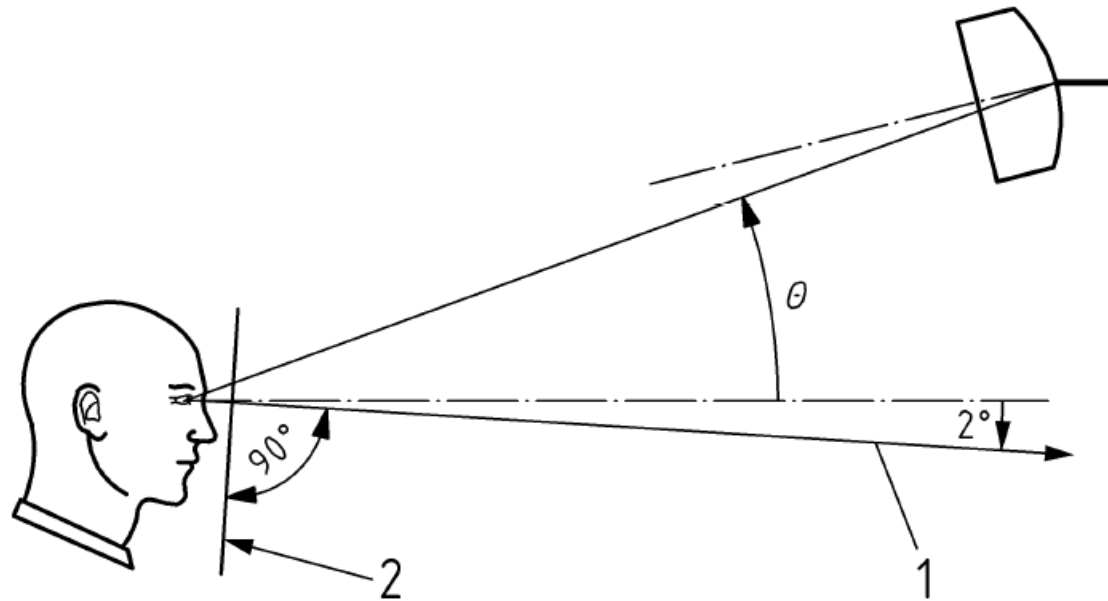
CIE's Standard Observer

Appendix 11F

CIE's standard observer

The angle between the observer's line of sight and the direction of the light incident from the individual luminaire

(Extracted from BS EN 12464-2 Figure 1)



Key:

- 1 line of sight is 2 degree below horizontal according to BS EN 12464-2
- 2 plane of E_{eye}

Appendix 11G

**MPSC Preliminary Lighting Layout and
Lighting Fittings Characters**

Overview of product data:
5NA75601WP11

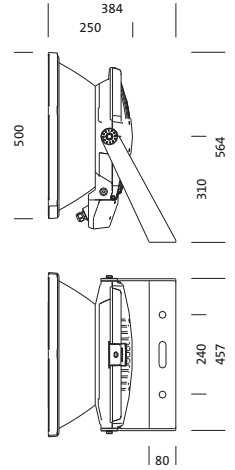
R3MAXI-P,1x2000W,HITDE,L187,w/o.CG,TSG

1/3



Product description

SiCOMPACT® R3 MAXI P, projector, primary light control with reflector, of aluminium, plated and anodised, highly specular, primary optical cover: cover panel, of toughened safety glass, transparent, light emission: direct distribution, primary light characteristic: rotationally symmetric, installation type: surface-mounted, for 1 x HIT-DE l=187 2000W, superimposed pulse ignitor without auto. power-off, control gear: without control gear, with terminal, 3-pole, max. 2.5mm², mains connection: 400V, AC, 50Hz, luminaire housing, of diecast aluminium, coated, Siteco® metallic grey (DB 702S), length: 248 mm, width: 500 mm, height: 558mm, mounting bracket, trapezoid, of steel, galvanised, coated, Siteco® metallic grey (DB 702S), protection rating (complete): IP65, insulation class (complete): insulation class I (protective earthing), certification: CE, impact resistance: IK09, standard: EN 50419, packaging unit: 1 piece,

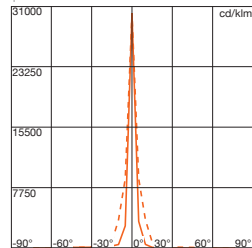


IP 65 IK 09

Lamps: 1x HIT-DE l=187 2000W
 Socket: K12s-36
 Wt. (kg): 13.5
 Order No.: 5NA75601WP11
 EAN: 4039806592460

5NA75601WP11: 1x HIT-DE-h15 2000W/959 Leitung l=187

5NA75601WP11
 1 x HIT-DE-h15 2000W/959 Leitung l=187
 φ 210000 lm



Imax 30089 cd/klm at γ 0°
 C 0/180 C 90/270
 0.50% 2 x 2.2° 2 x 3.6°
 0.10% 2 x 5.3° 2 x 10.9°

H(m)	φ(m)	E _{max} (lx)	E _m (lx)
4	0.31	394920	306784
8	0.61	98730	76696
12	0.92	43880	34087
16	1.23	24682	19174
20	1.54	15797	12271

Overview of product data:
5NA75301WB02

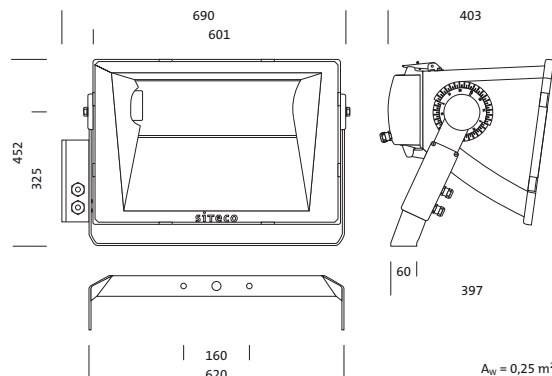
1/3

S2MAXI,1x2000W,HITDE,L187,w/o.CG,TSG,dir



Product description

SiCOMPACT® S2 MAXI, floodlight, primary light control with reflector, of aluminium, highly specular, primary anti-glare with V-shield, of aluminium, highly specular, primary optical cover: cover panel, of toughened safety glass, light emission: direct distribution, primary light characteristic: symmetric, bifocal, installation type: surface-mounted, for 1 x HIT-DE l=187 2000W, superimposed pulse ignitor, internal, control gear: without control gear, with terminal, 3-pole, max. 2.5mm², mains connection: 400V, AC, 50Hz, luminaire housing, of diecast aluminium, sandblasted, natural, length: 690 mm, width: 403 mm, height: 452mm, mounting bracket, of steel, galvanised, protection rating (complete): IP65, insulation class (complete): insulation class I (protective earthing), certification: CE, standard: EN 50419, packaging unit: 1 piece,

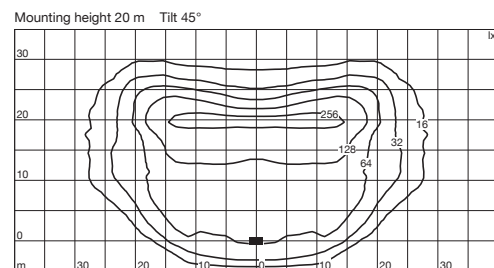
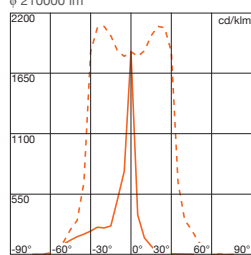


IP 65

- Lamps: 1x HIT-DE l=187 2000W
- Socket: K12s-36
- Wt. (kg): 21.5
- Order No.: 5NA75301WB02
- EAN: 4039806210104

5NA75301WB02: 1x HIT-DE-h15 2000W/959 Leitung l=187

5NA75301WB02
1 x HIT-DE-h15 2000W/959 Leitung l=187
Φ 210000 lm



Overview of product data:
5NA76901WB02

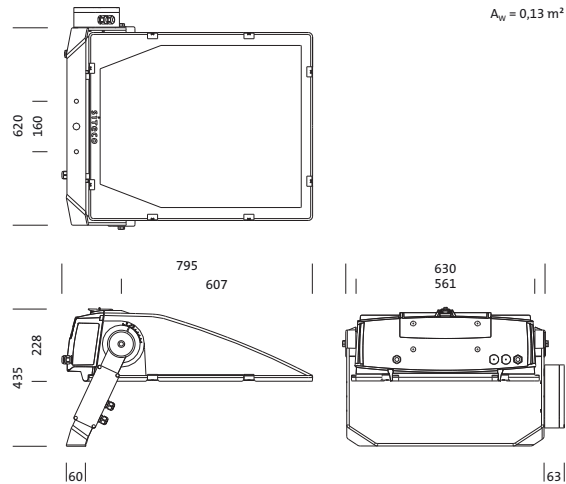
1/3

A3MAXI,1x2000W,HITDE,L187,w/o.CG,TSG,dir



Product description

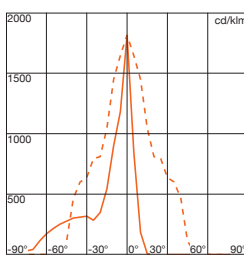
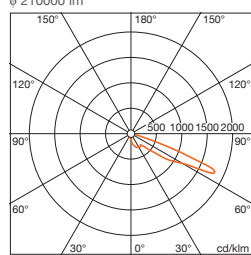
SiCOMPACT® A3 MAXI, floodlight, primary light control with reflector, of aluminium, highly specular, primary optical cover: cover panel, of toughened safety glass, light emission: direct distribution, primary light characteristic: asymmetric, installation type: surface-mounted, for 1 x HIT-DE l=187 2000W, superimposed pulse ignitor, internal, control gear: without control gear, with terminal, 3-pole, max. 2.5mm², mains connection: 400V, AC, 50Hz, luminaire housing, of diecast aluminium, sandblasted, natural, length: 795 mm, width: 620 mm, height: 228mm, mounting bracket, of steel, galvanised, protection rating (complete): IP65, insulation class (complete): insulation class I (protective earthing), certification: CE, ENEC, VDE, impact resistance: IK08, standard: EN 50419, packaging unit: 1 piece,



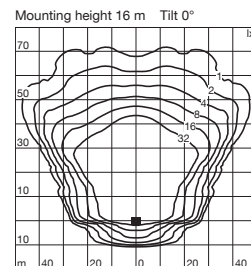
Lamps: 1x HIT-DE l=187 2000W
 Socket: K12s-36
 Wt. (kg): 22.1
 Order No.: 5NA76901WB02
 EAN: 4050737068008

5NA76901WB02: 1x HIT-DE-h15 2000W/959 Leitung l=187

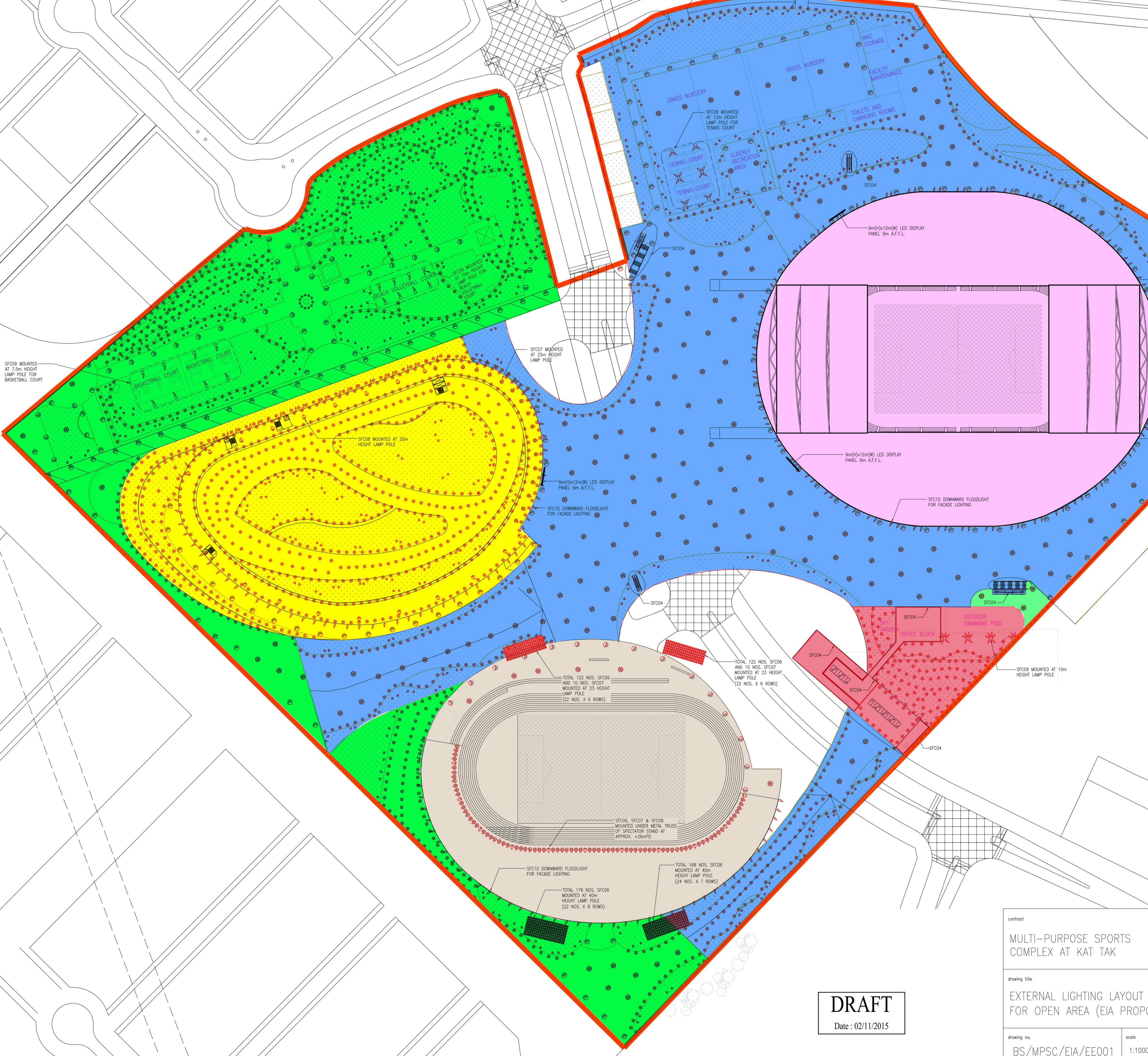
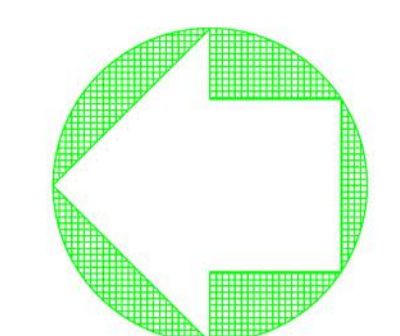
5NA76901WB02
 1 x HIT-DE-h15 2000W/959 Leitung l=187
 φ 210000 lm



Imax 1815 cd/klm Tilt 65.2°
 A 0 (C 0/180) B 0



- LEGEND**
- LAWN / Ground covers
 - Shrubs
 - Tree
 - Podium Deck
 - Main Stadium
 - Office and Hotel Block
 - Public Sports Ground
 - Indoor Sports Center
 - Open Space



DESIGN ILLUMINANCE

AREA	DESIGN AVERAGE ILLUMINANCE ON GROUND (LUX)
MAIN PATHWAYS IN THE PARK AREA / LAWN	10
CHILDREN PLAY AREA	50
ELDERLY FITNESS AREA	50
TREES (FOR HIGHLIGHTING PURPOSE ONLY)	20
SPORT AREA INSIDE MAIN STADIUM	3500
SPORT AREA INSIDE SECONDARY STADIUM	1400
STEP	50
BASKETBALL COURT	75
TENNIS COURT	200
BEACH VOLLEYBALL COURT	75
OUTDOOR SWIMMING POOL	200
GOLF DRIVING RANGE	100
LED DISPLAY PANEL	7000cd/sq.m.

LIGHTING FITTING SCHEDULE

REF. NO.	DESCRIPTIONS	SYMBOL	LAMP ELEMENT	COLOR TEMP.	MAX. SOURCE INTENSITY	MAX. AVERAGE ILLUMINANCE	SKETCH OF FITTING
SFC01	SECONDARY REFLECTOR LUMINAIRE MOUNTED ON POLE TOP AT 5m WITH SYMMETRIC LIGHT DISTRIBUTION. PRIMARY REFLECTOR OF ALUMINUM, SPECULAR. PRIMARY OPTICAL COVER : COVER PANEL, OF TOUCHED SAFETY TRANSPARENT GLASS. PRIMARY LIGHT CONTROL WITH SECONDARY REFLECTOR, OF PLASTIC, ALUMINUM VAPORISED, WITH HIGHLY SPECULAR. C/W DIE CAST ALUMINUM BODY WITH GLASS-FIBRE REINFORCED POLYESTER COATING. ROUND ALUMINUM CANOPY WITH GLASS-FIBRE REINFORCED POLYESTER COATING. C/W 6.2m HEIGHT POWER COATED DIE CAST ALUMINUM LAMP POLE WITH SERVICE BOX FROM LUMINAIRE MANUFACTURER AND WITH ANY OTHER NECESSARY ACCESSORIES. PROTECTION CLASS TO IP65.		2 X 70W CERAMIC DISCHARGE METAL HALIDE TUBULAR LAMP	3000K	6.89 kcd	10 cd/m ²	
SFC02	SECONDARY REFLECTOR LUMINAIRE MOUNTED ON POLE TOP AT 5m WITH ASYMMETRIC LIGHT DISTRIBUTION. PRIMARY LIGHT CONTROL, WITH REFLECTOR OF ALUMINUM, SPECULAR. PRIMARY OPTICAL COVER : COVER PANEL, OF TOUCHED SAFETY TRANSPARENT GLASS. PRIMARY LIGHT CONTROL WITH SECONDARY REFLECTOR, OF PLASTIC, ALUMINUM VAPORISED, WITH HIGHLY SPECULAR. C/W DIE CAST ALUMINUM BODY WITH GLASS-FIBRE REINFORCED POLYESTER COATING. ROUND ALUMINUM CANOPY WITH GLASS-FIBRE REINFORCED POLYESTER COATING. C/W 6.2m HEIGHT POWER COATED DIE CAST ALUMINUM LAMP POLE WITH SERVICE BOX FROM LUMINAIRE MANUFACTURER AND WITH ANY OTHER NECESSARY ACCESSORIES. PROTECTION CLASS TO IP65.		1 X 70W CERAMIC DISCHARGE METAL HALIDE TUBULAR LAMP	3000K	6.89 kcd	10 cd/m ²	
SFC03	APPROX 800mm HIGH LUMINAIRE OF HORIZONTAL SURFACES WITH ASYMMETRIC LIGHT DISTRIBUTION. C/W DIE CAST ALUMINUM BODY, CLEAR SAFETY GLASS, ELECTRONIC BALLAST, REFLECTOR OF PURE ANODISED ALUMINUM, CONNECTION BOX AND ANY OTHER NECESSARY ACCESSORIES. PROTECTION CLASS TO IP65.		1 X 20W CERAMIC DISCHARGE METAL HALIDE TUBULAR LAMP	3000K	3.6 kcd	10 cd/m ²	
SFC04	RECTANGULAR SHAPE RECESSED MOUNTED LUMINAIRE WITH DIE-CAST ALUMINUM HOUSING, CLEAR SAFETY GLASS, REFLECTOR OF PURE ANODISED ALUMINUM, PROTECTION CLASS TO IP65.		1 X 36W COMPACT FLUORESCENT LAMP	3000K	1.1 kcd	10 cd/m ²	
SFC05	105mm DIAMETER LED FLOODLIGHT WITH MOUNTING BOX, EARTH SPIKE AND SCREW CLAMP. HOUSING MADE OF GLASS FIBRE REINFORCED POLYAMIDE. A SAFETY GLASS WITH PURE ANODISED ALUMINUM REFLECTOR, PROTECTION CLASS TO IP65.		LED FLOODLIGHT - 4.5W	3000K	0.11 kcd	10 cd/m ²	
SFC06	500mm DIA. CIRCULAR LIGHTING FITTING WITH HIGH EFFICIENCY PROJECTOR WITH ROTOSYMMETRICAL LIGHT BEAM, DIECAST ALUMINUM HOUSING AND COVER RING, METALLIC GREY SURFACE FINISH; HIGH-GRADE ALUMINUM REFLECTOR COMPONENTS WITH HIGH-PURITY SURFACE COATING; ZINC-PLATED AND COATED STEEL MOUNTING BRACKET; REFLECTOR VARIATIONS FOR DIFFERENT GRADED LIGHT DISTRIBUTION CURVES WITH FEATURE FOR INSTANT HOT RE-IGNITION, OPERATION WITH SEPARATELY REMOTE CONTROL GEAR, MODULE FOR GLARE REDUCTION; COVER OF TOUCHED SAFETY GLASS AND PROTECTION CLASS TO IP65.		1 X 2000W METAL HALIDE TUBULAR LAMP (DOUBLE ENDED TYPE)	5500K	2252 kcd	2400cd/m ² (VERTICAL) AT PITCH LEVEL	
SFC07	FLOODLIGHT WITH HIGH EFFICIENCY PROJECTOR WITH SYMMETRIC BIFOCAL NARROW DISTRIBUTION LIGHT BEAM, DIECAST ALUMINUM HOUSING AND COVER RING, METALLIC GREY SURFACE FINISH; HIGH-GRADE ALUMINUM REFLECTOR COMPONENTS WITH HIGH-PURITY SURFACE COATING; ZINC-PLATED AND COATED STEEL MOUNTING BRACKET; REFLECTOR VARIATIONS FOR DIFFERENT GRADED LIGHT DISTRIBUTION CURVES WITH FEATURE FOR INSTANT HOT RE-IGNITION, OPERATION WITH SEPARATELY REMOTE CONTROL GEAR, MODULE FOR GLARE REDUCTION; COVER OF TOUCHED SAFETY GLASS AND PROTECTION CLASS TO IP65.		1 X 2000W METAL HALIDE TUBULAR LAMP (DOUBLE ENDED TYPE)	5500K	2252 kcd	2400cd/m ² (VERTICAL) AT PITCH LEVEL	
SFC08	FLOODLIGHT WITH HIGH EFFICIENCY PROJECTOR WITH ASYMMETRIC NARROW DISTRIBUTION LIGHT BEAM, DIECAST ALUMINUM HOUSING AND COVER RING, METALLIC GREY SURFACE FINISH; HIGH-GRADE ALUMINUM REFLECTOR COMPONENTS WITH HIGH-PURITY SURFACE COATING; ZINC-PLATED AND COATED STEEL MOUNTING BRACKET; REFLECTOR VARIATIONS FOR DIFFERENT GRADED LIGHT DISTRIBUTION CURVES WITH FEATURE FOR INSTANT HOT RE-IGNITION, OPERATION WITH SEPARATELY REMOTE CONTROL GEAR, MODULE FOR GLARE REDUCTION; COVER OF TOUCHED SAFETY GLASS AND PROTECTION CLASS TO IP65.		1 X 2000W METAL HALIDE TUBULAR LAMP (DOUBLE ENDED TYPE)	5500K	2252 kcd	2400cd/m ² (VERTICAL) AT PITCH LEVEL	
SFC09	FLOODLIGHT WITH HIGH EFFICIENCY PROJECTOR WITH ASYMMETRIC NARROW DISTRIBUTION LIGHT BEAM, DIECAST ALUMINUM HOUSING AND COVER RING, METALLIC GREY SURFACE FINISH; HIGH-GRADE ALUMINUM REFLECTOR COMPONENTS WITH HIGH-PURITY SURFACE COATING; ZINC-PLATED AND COATED STEEL MOUNTING BRACKET; REFLECTOR VARIATIONS FOR DIFFERENT GRADED LIGHT DISTRIBUTION CURVES WITH FEATURE FOR INSTANT HOT RE-IGNITION, OPERATION WITH SEPARATELY REMOTE CONTROL GEAR, MODULE FOR GLARE REDUCTION; COVER OF TOUCHED SAFETY GLASS AND PROTECTION CLASS TO IP65.		1 X 400W METAL HALIDE TUBULAR LAMP	3000K	71 kcd	200 cd/m ²	
SFC10	FLOODLIGHT WITH HIGH EFFICIENCY PROJECTOR WITH ASYMMETRIC NARROW DISTRIBUTION LIGHT BEAM, DIECAST ALUMINUM HOUSING AND COVER RING, METALLIC GREY SURFACE FINISH; HIGH-GRADE ALUMINUM REFLECTOR COMPONENTS WITH HIGH-PURITY SURFACE COATING; ZINC-PLATED AND COATED STEEL MOUNTING BRACKET; REFLECTOR VARIATIONS FOR DIFFERENT GRADED LIGHT DISTRIBUTION CURVES WITH FEATURE FOR INSTANT HOT RE-IGNITION, OPERATION WITH SEPARATELY REMOTE CONTROL GEAR, MODULE FOR GLARE REDUCTION; COVER OF TOUCHED SAFETY GLASS AND PROTECTION CLASS TO IP65.		1 X 2000W METAL HALIDE TUBULAR LAMP	3000K	272 kcd	20 cd/m ²	

contract

MULTI-PURPOSE SPORTS COMPLEX AT KAT TAK

drawing title

EXTERNAL LIGHTING LAYOUT PLAN FOR OPEN AREA (EIA PROPOSAL)

drawing no.

BS/MPSC/EIA/EE001

scale

1:1000 @B1

DRAFT
Date : 02/11/2015

REVISION

no.	date	description	initial
E	11-NOV-2015	EXTERNAL LIGHTING LAYOUT REVISED TO SUIT LATEST LAYOUT	
D	27-AUG-2015	EXTERNAL LIGHTING LAYOUT REVISED TO SUIT LATEST LAYOUT	
C	21-AUG-2015	EXTERNAL LIGHTING LAYOUT REVISED TO SUIT LATEST LAYOUT	
B	29-JUL-2015	EXTERNAL LIGHTING LAYOUT REVISED TO SUIT LATEST LAYOUT	
A	23-JUN-2015	EXTERNAL LIGHTING LAYOUT REVISED TO SUIT WITH GOLF DRIVING RANGE FOR ROOF AREA OF ISC	

NOTES:

- LIGHTING LAYOUT PLAN IS BASED ON THE LATEST LAYOUT PLAN RECEIVED ON 02-NOV-2015
- AS MAIN STADIUM IS COVERED BY RETRACTABLE ROOF, THE LIGHTING INSIDE THE STADIUM SHOULD NOT BE CONSIDERED AS EXTERNAL LIGHTING AND EXCLUDED FROM THIS LAYOUT FOR EIA EXERCISE.
- DESIGN FOR LIGHTING IN SECONDARY STADIUM SHALL IN GENERAL FOLLOW RECOMMENDATIONS GIVEN IN "LIGHTING GUIDE 4: SPORTS LIGHTING" (L04) PUBLISHED BY CBSE. IT IS DESIGNED FOR NATIONAL COMPETITIONS. IT IS SUITABLE FOR BROADCAST REQUIREMENT.
- DESIGN FOR LIGHTING IN BASKETBALL COURT, TENNIS COURT & VOLLEYBALL COURT SHALL IN GENERAL FOLLOW RECOMMENDATIONS GIVEN IN "LIGHTING GUIDE 4: SPORTS LIGHTING" (L04) PUBLISHED BY CBSE. LIGHTING CLASS II IN CBSE L04 SHALL BE ACHIEVED WITH RECOMMENDED AVERAGE HORIZONTAL ILLUMINANCE LEVEL 75 LUX, 200 LUX & 75 LUX FOR BASKETBALL COURT, TENNIS COURT & VOLLEYBALL COURT RESPECTIVELY. THEY ARE DESIGNED FOR COURT RESPECTIVELY. THEY ARE DESIGNED FOR RECREATIONAL ACTIVITIES. THEY ARE NOT SUITABLE FOR HOTV BROADCAST REQUIREMENT.
- FEATURE LIGHTINGS ARE NOT INCLUDED IN THIS DRAWING.
- LIGHT SHIELDING SHOULD BE ADOPTED FOR FLOOD LIGHTING IN SECONDARY STADIUM, BASKETBALL COURT, TENNIS COURT & BEACH VOLLEYBALL COURT.
- THE LOCATION OF LAMP POLES FOR SPORT FACILITIES SHOULD BE ADJUSTED SUBJECT TO THE REQUIREMENT OF SAFETY ZONE FOR THE SPORT FACILITIES.
- THE TREE LIGHTING WOULD BE FURTHER INCORPORATED UPON CONFIRMATION OF LOCATION OF TREES IN LAYOUT BY LANDSCAPE CONSULTANT.

Glare impact calculation to Light Sensitivity Receiver L-13R

Future Mixed Development at Northwest of MPSC

Sensitivity Receiver L13R Coordinate		
X (m)	Y (m)	Z (mPD)
838080	820759	21.0

The inverse square law and cosine law can be used to calculate illuminance at a point from intensity data.

$$\text{horizontal illuminance (lx)} E_h = (r \times f \times \beta \times I \times \cos\theta) / d^2$$

where I is intensity of lighting source (cd),

β is beam factor (proportion of lamp lumens contained within the beam)=0.9,

d is the distance from the light source to sensitive receiver (m),

θ is the angle of incidence of the intensity of a light source,

f is maintenance factor= 0.7

r is Approximate reflectance

for concrete ground=	0.4
for wall surface=	0.6
for grass=	0.2

Direct Light										Reflected light					Illuminance at the observer's eye in a plane perpendicular to the line of sight caused by the lighting installation E eye						
Light source LSI: Main Stadium																					
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1a	Light Sources Type	SFC02	Approximate reflectance factor for concrete ground 0.4																
Light Source ID.	Light source intensity I (cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaires $\Phi = \arctan(d/h) - 2$	Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaires $\Phi = \arctan(d/2h) - 2$	Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	$\tan\Phi$	$E_{eye} = E_h \times \tan\Phi$	Total Veiling Luminance from all luminaires $L_{vl} = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$	
		X (m)	Y (m)	Z (mPD)																	d/h
LS1a (1)	6890	838277	820404	18	406	3	1.56	88	5.00E-03	406	1.08E-06	406	1.51	84	1.00E-02	407	7.45E-06	23.63	2.55E-05	4.34E-05	2
LS1a (2)		838283	820418		397		1.56	88	5.00E-03	397	1.15E-06	397	1.51	84	1.00E-02	397	7.98E-06	23.54	2.72E-05	4.59E-05	2
LS1a (3)		838290	820431		390		1.56	88	5.00E-03	390	1.22E-06	390	1.50	84	1.00E-02	390	8.43E-06	23.46	2.86E-05	4.80E-05	2
LS1a (4)		838300	820443		385		1.56	88	5.00E-03	385	1.27E-06	385	1.50	84	1.00E-02	385	8.75E-06	23.41	2.96E-05	4.95E-05	2
LS1a (5)		838310	820455		382		1.56	88	5.00E-03	382	1.30E-06	382	1.50	84	1.00E-02	382	8.98E-06	23.37	3.04E-05	5.06E-05	2
LS1a (6)		838322	820465		381		1.56	88	5.00E-03	381	1.31E-06	381	1.50	84	1.00E-02	381	9.02E-06	23.36	3.05E-05	5.08E-05	2
LS1a (7)		838335	820472		384		1.56	88	5.00E-03	384	1.28E-06	384	1.50	84	1.00E-02	384	8.84E-06	23.39	2.99E-05	4.99E-05	2
LS1a (8)		838349	820478		389		1.56	88	5.00E-03	389	1.23E-06	389	1.50	84	1.00E-02	390	8.47E-06	23.45	2.88E-05	4.82E-05	2
LS1a (9)		838364	820482		397		1.56	88	5.00E-03	397	1.16E-06	397	1.51	84	1.00E-02	397	8.00E-06	23.53	2.72E-05	4.60E-05	2
LS1a (10)		838379	820483		407		1.56	88	5.00E-03	407	1.07E-06	407	1.51	84	1.00E-02	407	7.43E-06	23.64	2.54E-05	4.33E-05	2
LS1a (11)		838394	820482		419		1.56	88	5.00E-03	419	9.86E-07	419	1.51	84	1.00E-02	419	6.82E-06	23.75	2.34E-05	4.03E-05	2
LS1a (12)		838408	820479		432		1.56	88	5.00E-03	432	8.98E-07	432	1.51	85	1.00E-02	432	6.21E-06	23.88	2.14E-05	3.73E-05	2
LS1a (13)		838422	820474		446		1.56	88	5.00E-03	446	8.17E-07	446	1.51	85	1.00E-02	446	5.65E-06	24.00	1.96E-05	3.44E-05	2
LS1a (14)		838435	820466		460		1.56	88	5.00E-03	460	7.42E-07	460	1.51	85	1.00E-02	461	5.13E-06	24.13	1.79E-05	3.18E-05	2
LS1a (15)		838446	820457		475		1.56	88	5.00E-03	475	6.74E-07	475	1.52	85	1.00E-02	475	4.66E-06	24.25	1.63E-05	2.93E-05	2
LS1a (16)		838457	820446		490		1.56	88	5.00E-03	490	6.14E-07	490	1.52	85	1.00E-02	490	4.25E-06	24.36	1.50E-05	2.71E-05	2
LS1a (17)		838466	820434		505		1.56	88	5.00E-03	505	5.62E-07	505	1.52	85	1.00E-02	505	3.89E-06	24.47	1.38E-05	2.51E-05	2
LS1a (41)		838314	820251		560		1.57	88	5.00E-03	560	4.12E-07	560	1.52	85	1.00E-02	560	2.85E-06	24.82	1.02E-05	1.92E-05	2
LS1a (42)		838303	820261		546		1.57	88	5.00E-03	546	4.45E-07	546	1.52	85	1.00E-02	546	3.08E-06	24.74	1.10E-05	2.06E-05	2
LS1a (43)		838294	820273		531		1.57	88	5.00E-03	531	4.83E-07	531	1.52	85	1.00E-02	531	3.34E-06	24.64	1.19E-05	2.21E-05	2
LS1a (44)		838286	820286		516		1.56	88	5.00E-03	516	5.26E-07	516	1.52	85	1.00E-02	516	3.64E-06	24.55	1.29E-05	2.37E-05	2
LS1a (45)		838279	820299		501		1.56	88	5.00E-03	501	5.74E-07	501	1.52	85	1.00E-02	502	3.97E-06	24.44	1.40E-05	2.56E-05	2
LS1a (46)		838275	820314		486		1.56	88	5.00E-03	486	6.29E-07	486	1.52	85	1.00E-02	487	4.35E-06	24.33	1.53E-05	2.76E-05	2

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/2/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{h\text{av}} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_{\text{eye}} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree							
LS1a (47)		838275	820314		486		1.56	88	5.00E-03	486	6.29E-07	486		1.52	85	1.00E-02	487	4.35E-06	24.33	1.53E-05	2.76E-05	2
LS1a (48)		838272	820329		472		1.56	88	5.00E-03	472	6.89E-07	472		1.52	85	1.00E-02	472	4.76E-06	24.22	1.67E-05	2.98E-05	2
LS1a (49)		838272	820359		444		1.56	88	5.00E-03	444	8.26E-07	444		1.51	85	1.00E-02	444	5.72E-06	23.99	1.98E-05	3.48E-05	2
LS1a (50)		838272	820374		430		1.56	88	5.00E-03	430	9.08E-07	430		1.51	85	1.00E-02	430	6.28E-06	23.86	2.17E-05	3.76E-05	2
sum										2.35E-05	sum										1.62E-04	
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1b	Light Sources Type	SFC10	Approximate reflectance factor for wall surface						0.6											
LS1b(1)	272000	838277	820404	40	19	No direct light	19	1.52	85	5.00E-03	407	409	1.48	83	1.00E-02	410	6.29E-04	12.22	0.00E+00	0.00E+00	5	
LS1b(2)		838283	820418					397	1.52	85	5.00E-03	398	400	1.48	83	1.00E-02	401	6.73E-04	12.06	0.00E+00	0.00E+00	5
LS1b(3)		838290	820431					390	1.52	85	5.00E-03	390	393	1.47	82	1.00E-02	393	7.11E-04	11.93	0.00E+00	0.00E+00	5
LS1b(4)		838300	820443					385	1.52	85	5.00E-03	386	388	1.47	82	1.00E-02	389	7.37E-04	11.85	0.00E+00	0.00E+00	5
LS1b(5)		838310	820455					382	1.52	85	5.00E-03	382	385	1.47	82	1.00E-02	385	7.56E-04	11.79	0.00E+00	0.00E+00	5
LS1b(6)		838322	820465					381	1.52	85	5.00E-03	382	384	1.47	82	1.00E-02	385	7.60E-04	11.78	0.00E+00	0.00E+00	5
LS1b(7)		838335	820472					384	1.52	85	5.00E-03	384	387	1.47	82	1.00E-02	387	7.45E-04	11.82	0.00E+00	0.00E+00	5
LS1b(8)		838349	820478					389	1.52	85	5.00E-03	390	392	1.47	82	1.00E-02	393	7.14E-04	11.92	0.00E+00	0.00E+00	5
LS1b(9)		838364	820482					397	1.52	85	5.00E-03	397	400	1.48	83	1.00E-02	400	6.74E-04	12.06	0.00E+00	0.00E+00	5
LS1b(10)		838379	820483					407	1.52	85	5.00E-03	407	410	1.48	83	1.00E-02	410	6.27E-04	12.23	0.00E+00	0.00E+00	5
LS1b(11)		838387	820483					413	1.52	85	5.00E-03	413	416	1.48	83	1.00E-02	416	5.99E-04	12.34	0.00E+00	0.00E+00	5
LS1b(12)		838401	820481					426	1.53	85	5.00E-03	426	429	1.48	83	1.00E-02	429	5.48E-04	12.55	0.00E+00	0.00E+00	5
LS1b(13)		838416	820476					439	1.53	86	5.00E-03	440	442	1.49	83	1.00E-02	443	4.98E-04	12.78	0.00E+00	0.00E+00	4
LS1b(14)		838429	820470					454	1.53	86	5.00E-03	454	457	1.49	83	1.00E-02	457	4.53E-04	13.00	0.00E+00	0.00E+00	4
LS1b(15)		838442	820461					469	1.53	86	5.00E-03	469	472	1.49	83	1.00E-02	472	4.11E-04	13.24	0.00E+00	0.00E+00	4
LS1b(16)		838452	820451					484	1.53	86	5.00E-03	484	487	1.49	84	1.00E-02	487	3.75E-04	13.46	0.00E+00	0.00E+00	4
LS1b(17)		838466	820434					505	1.53	86	5.00E-03	505	508	1.50	84	1.00E-02	508	3.30E-04	13.76	0.00E+00	0.00E+00	4
LS1b(41)		838314	820251					560	1.54	86	5.00E-03	560	563	1.50	84	1.00E-02	563	2.42E-04	14.51	0.00E+00	0.00E+00	4
LS1b(42)		838303	820261					546	1.54	86	5.00E-03	546	549	1.50	84	1.00E-02	549	2.62E-04	14.32	0.00E+00	0.00E+00	4
LS1b(43)		838294	820273					531	1.54	86	5.00E-03	531	534	1.50	84	1.00E-02	534	2.84E-04	14.13	0.00E+00	0.00E+00	4
LS1b(44)	838286	820286	516	1.53	86	5.00E-03	517	519	1.50	84	1.00E-02	520	3.09E-04	13.92	0.00E+00	0.00E+00	4					
LS1b(45)	838279	820299	501	1.53	86	5.00E-03	502	504	1.50	84	1.00E-02	505	3.37E-04	13.72	0.00E+00	0.00E+00	4					
LS1b(46)	838275	820314	486	1.53	86	5.00E-03	487	489	1.49	84	1.00E-02	490	3.69E-04	13.50	0.00E+00	0.00E+00	4					
LS1b(47)	838275	820314	486	1.53	86	5.00E-03	487	489	1.49	84	1.00E-02	490	3.69E-04	13.50	0.00E+00	0.00E+00	4					
LS1b(48)	838272	820329	472	1.53	86	5.00E-03	472	475	1.49	83	1.00E-02	475	4.04E-04	13.28	0.00E+00	0.00E+00	4					
LS1b(49)	838272	820359	444	1.53	86	5.00E-03	444	447	1.49	83	1.00E-02	447	4.83E-04	12.85	0.00E+00	0.00E+00	4					
LS1b(50)	838272	820374	430	1.53	85	5.00E-03	431	433	1.48	83	1.00E-02	434	5.31E-04	12.63	0.00E+00	0.00E+00	5					
sum										0.00E+00	0.00	sum										1.38E-02
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1c	Light Sources Type	LED																		
LS1c (2)	756000	838322	820465	17.5	381	3.5	1.56	87	5.00E-03	381	1.67E-04	381	3.5	1.56	87	1.00E-02	381	1.91E-04	22.67	3.79E-03	5.94E-03	3
sum										1.91E-04	0.00	sum										1.42E-02
Light Source LS2: Public Sports Ground																						
Light Sources drawing are referred to Page 4 in Appendix 11G		LS2b	Light Sources Type	SFC6	Approximate reflectance factor for grass						0.2											
LS2b (1)	81072000	838123	820578.82	30	186	9	1.52	85	0.00E+00	186	No direct light	186	16	1.40	78	1.00E-02	186	4.46E-01	11.97	0.00E+00	0.00E+00	5
LS2b (3)	378336000	838123	820578.82	36	186	15	1.49	83	0.00E+00	186	No direct light	186	16	1.40	78	1.00E-02	186		8.62	0.00E+00	0.00E+00	7
sum										0.00E+00		sum										4.46E-01

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of light incident from the individual luminaries $\Phi = \arctan(d/2/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{h\text{av}} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan \Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_{\text{eye}} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$	
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree								
		sum																					
LS3b (1)	6890	838287	820850	31	226	10	1.53	85	5.00E-03	226	2.08E-05	226	15.0	1.44	80	5.00E-03	227	2.47E-05	12.62	2.62E-04	1.28E-04	5	
LS3b (2)		838272	820851		214		1.52	85	5.00E-03	214	2.47E-05	214		1.43	80	5.00E-03	214	2.93E-05	12.21	3.02E-04	1.38E-04	5	
LS3b (3)		838260	820844		199		1.52	85	5.00E-03	199	3.05E-05	199		1.42	79	5.00E-03	199	3.62E-05	11.72	3.58E-04	1.50E-04	5	
LS3b (4)		838249	820834		184		1.52	85	5.00E-03	185	3.82E-05	184		1.41	79	5.00E-03	185	4.52E-05	11.20	4.28E-04	1.64E-04	5	
LS3b (5)		838238	820823		170		1.51	85	5.00E-03	171	4.85E-05	170		1.40	78	5.00E-03	171	5.71E-05	10.66	5.17E-04	1.80E-04	5	
LS3b (6)		838229	820811		158		1.51	84	5.00E-03	158	6.08E-05	158		1.38	77	5.00E-03	159	7.14E-05	10.16	6.17E-04	1.95E-04	6	
LS3b (7)		838222	820798		147		1.50	84	5.00E-03	147	7.54E-05	147		1.37	76	5.00E-03	148	8.84E-05	9.69	7.31E-04	2.10E-04	6	
LS3b (8)		838215	820784		138		1.50	84	5.00E-03	138	9.15E-05	138		1.36	76	5.00E-03	139	1.07E-04	9.28	8.49E-04	2.24E-04	6	
LS3b (9)		838210	820770		131		1.49	84	5.00E-03	131	1.06E-04	131		1.35	75	5.00E-03	132	1.24E-04	8.96	9.53E-04	2.35E-04	6	
LS3b (10)		838207	820755		127		1.49	83	5.00E-03	127	1.17E-04	127		1.34	75	5.00E-03	128	1.36E-04	8.77	1.02E-03	2.42E-04	7	
LS3b (11)		838206	820740		127		1.49	84	5.00E-03	128	1.16E-04	127		1.34	75	5.00E-03	128	1.35E-04	8.79	1.02E-03	2.42E-04	6	
LS3b (12)		838207	820725		132		1.50	84	5.00E-03	132	1.04E-04	132		1.35	75	5.00E-03	133	1.22E-04	9.00	9.39E-04	2.34E-04	6	
LS3b (13)		838210	820710		139		1.50	84	5.00E-03	139	8.94E-05	139		1.36	76	5.00E-03	140	1.04E-04	9.33	8.34E-04	2.23E-04	6	
LS3b (14)		838214	820695		148		1.50	84	5.00E-03	149	7.35E-05	148		1.37	77	5.00E-03	149	8.61E-05	9.75	7.16E-04	2.09E-04	6	
sum																	9.96E-04	sum					1.17E-03
Light Sources drawing are referred to Page 4 in Appendix 11G		LS3c	Light Sources Type		SFC03	Approximate reflectance factor for grass					0.2												
LS3c (4)	36000	838220	820812	15.8	150	5.2	1.54	86	5.00E-03	150	1.95E-04	150	4	1.52	85	1.00E-02	150	1.08E-04	14.34	2.79E-03	1.76E-03	4	
LS3c (5)	36000	838244	820848	15.8	187	5.2	1.54	86	5.00E-03	187	1.00E-04	187	4	1.53	86	1.00E-02	187	5.56E-05	15.92	1.60E-03	1.24E-03	4	
LS3c (6)	36000	838262	820866	15.8	211	5.2	1.55	87	5.00E-03	211	6.99E-05	211	4	1.54	86	1.00E-02	211	3.87E-05	16.77	1.17E-03	1.01E-03	3	
LS3c (7)	36000	838283	820875	15.8	234	5.2	1.55	87	5.00E-03	234	5.11E-05	234	4	1.54	86	1.00E-02	234	2.83E-05	17.49	8.93E-04	8.34E-04	3	
LS3c (8)	36000	838308	820869	15.8	253	5.2	1.55	87	5.00E-03	253	4.05E-05	253	4	1.54	86	1.00E-02	253	2.24E-05	18.01	7.29E-04	7.22E-04	3	
LS3c (9)	36000	838321	820844	15.8	256	5.2	1.55	87	5.00E-03	256	3.90E-05	256	4	1.54	86	1.00E-02	256	2.16E-05	18.09	7.05E-04	7.05E-04	3	
LS3c (10)	36000	838340	820794	15.8	262	5.2	1.55	87	5.00E-03	262	3.63E-05	262	4	1.54	86	1.00E-02	262	2.01E-05	18.26	6.62E-04	6.73E-04	3	
LS3c (11)	36000	838357	820748	15.8	277	5.2	1.55	87	5.00E-03	277	3.07E-05	277	4	1.54	87	1.00E-02	277	1.70E-05	18.62	5.72E-04	6.05E-04	3	
LS3c (12)	36000	838374	820700	15.8	300	5.2	1.55	87	5.00E-03	300	2.43E-05	300	4	1.55	87	1.00E-02	300	1.34E-05	19.12	4.64E-04	5.18E-04	3	
LS3c (18)	36000	838209	820780	26.8	131	5.8	1.53	85	5.00E-03	131	3.23E-04	131	7	1.47	82	1.00E-02	131	2.93E-04	12.62	4.07E-03	1.98E-03	5	
LS3c (19)	36000	838236	820828	26.8	171	5.8	1.54	86	5.00E-03	171	1.47E-04	171	7	1.49	84	1.00E-02	171	1.34E-04	14.49	2.13E-03	1.37E-03	4	
LS3c (20)	18000	838263	820857	26.8	208	5.8	1.54	86	5.00E-03	208	4.08E-05	208	7	1.51	84	1.00E-02	208	3.71E-05	15.89	6.48E-04	5.00E-04	4	
LS3c (21)	14400	838285	820868	26.8	232	5.8	1.55	87	5.00E-03	232	2.33E-05	232	7	1.51	85	1.00E-02	232	2.12E-05	16.68	3.89E-04	3.31E-04	3	
LS3c (22)	18000	838308	820860	26.8	249	5.8	1.55	87	5.00E-03	249	2.36E-05	249	7	1.52	85	1.00E-02	249	2.14E-05	17.17	4.05E-04	3.64E-04	3	
LS3c (24)	21600	838317	820833	43.8	248	22.8	1.48	83	5.00E-03	249	1.11E-04	248	24	1.38	77	1.00E-02	249	9.08E-05	7.86	8.75E-04	1.67E-04	7	
LS3c (36)	10800	838264	820630	43.8	225	22.8	1.47	82	5.00E-03	226	7.45E-05	225	24	1.36	76	1.00E-02	226	6.06E-05	7.31	5.45E-04	8.99E-05	8	
LS3c (37)	18000	838249	820644	43.8	205	22.8	1.46	82	5.00E-03	206	1.64E-04	205	24	1.34	75	1.00E-02	206	1.33E-04	6.81	1.12E-03	1.60E-04	8	
LS3c (38)	18000	838235	820665	43.8	182	22.8	1.45	81	5.00E-03	184	2.32E-04	182	24	1.32	73	1.00E-02	184	1.87E-04	6.22	1.44E-03	1.73E-04	9	
LS3c (39)	18000	838223	820687	43.8	161	22.8	1.43	80	5.00E-03	162	3.36E-04	161	24	1.29	72	1.00E-02	162	2.69E-04	5.63	1.89E-03	1.86E-04	10	
LS3c (40)	18000	838217	820711	43.8	146	22.8	1.42	79	5.00E-03	147	4.50E-04	146	24	1.26	70	1.00E-02	147	3.58E-04	5.19	2.33E-03	1.96E-04	11	
LS3c (41)	18000	838214	820736	43.8	136	22.8	1.40	78	5.00E-03	138	5.45E-04	136	24	1.24	69	1.00E-02	138	4.32E-04	4.91	2.68E-03	2.03E-04	12	
LS3c (42)	21600	838219	820761	43.8	139	22.8	1.41	79	5.00E-03	141	6.17E-04	139	24	1.24	69	1.00E-02	141	4.90E-04	5.00	3.08E-03	2.41E-04	11	
LS3c (43)	18000	838228	820787	43.8	150	22.8	1.42	79	5.00E-03	152	4.08E-04	150	24	1.27	71	1.00E-02	152	3.25E-04	5.33	2.18E-03	1.93E-04	11	
LS3c (44)	10800	838238	820805	43.8	164	22.8	1.43	80	5.00E-03	166	1.88E-04	164	24	1.29	72	1.00E-02	166	1.51E-04	5.73	1.08E-03	1.10E-04	10	
LS3c (45)	14400	838250	820819	43.8	181	22.8	1.45	81	5.00E-03	182	1.91E-04	181	24	1.32	73	1.00E-02	182	1.54E-04	6.18	1.18E-03	1.39E-04	9	
LS3c (46)	21600	838268	820834	43.8	203	22.8	1.46	82	5.00E-03	204	2.03E-04	203	24	1.34	75	1.00E-02	204	1.65E-04	6.75	1.37E-03	1.94E-04	8	
LS3c (47)	18000	838293	820844	43.8	229	22.8	1.47	82	5.00E-03	230	1.17E-04	229	24	1.37	76	1.00E-02	230	9.57E-05	7.42	8.71E-04	1.48E-04	8	
sum																	4.78E-03	sum					3.74E-03
Light Sources drawing are referred to Page 4 in Appendix 11G		LS3d	Light Sources Type		SFC07&8	Approximate reflectance factor for grass					0.2												
LS3d(1)	2252000	838307	820838	68	241	47	1.38	77	0.00E+00	245	0.00E+00	241	48	1.19	66	1.00E-02	246	1.93E-02	4.32	0.00E+00	0.00E+00	13	
LS3d(2)	2252000	838321	820825	68	250	47	1.38	77	0.00E+00	254	0.00E+00	250	48	1.21	67	1.00E-02	254	1.74E-02	4.45	0.00E+00	0.00E+00	13	
LS3d(3)	2252000	838328	820805	68	253	47	1.39	77	0.00E+00	257	0.00E+00	253	48	1.21	67	1.00E-02	257	1.68E-02	4.50	0.00E+00	0.00E+00	13	
LS3d(4)	2252000	838336	820785	68	257	47	1.39	78	0.00E+00	261	0.00E+00	257	48	1.21	68	1.00E-02	262	1.61E-02	4.56	0.00E+00	0.00E+00	12	
LS3d(5)	2252000	838343	820766	68	263	47	1.39	78	0.00E+00	268	0.00E+00	263	48	1.22	68	1.00E-02	268	1.50E-02	4.66	0.00E+00	0.00E+00	12	
LS3d(6)	2252000	838351	820746	68	271	47	1.40	78	5.00E-03	275	1.78E-02	271	48	1.23	69	1.00E-02	275	1.38E-02	4.77	8.48E-02			

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/2h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{h\text{av}} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_{\text{eye}} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$	
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree								
LS3d(7)	2252000	838358	820726	68	280	47	1.40	78	5.00E-03	284	1.62E-02	280	48	1.24	69	1.00E-02	284	1.27E-02	4.90	7.95E-02	5.97E-03	12	
LS3d(8)	2252000	838365	820706	68	290	47	1.41	79	5.00E-03	294	1.46E-02	290	48	1.25	70	1.00E-02	294	1.14E-02	5.05	7.37E-02	5.87E-03	11	
LS3d(9)	2252000	838372	820690	68	300	47	1.42	79	5.00E-03	304	1.32E-02	300	48	1.26	70	1.00E-02	304	1.04E-02	5.19	6.86E-02	5.77E-03	11	
LS3d(10)	2252000	838373	820683	68	303	47	1.42	79	5.00E-03	307	1.28E-02	303	48	1.27	71	1.00E-02	307	1.00E-02	5.24	6.70E-02	5.74E-03	11	
LS3d(11)	2252000	838375	820674	68	307	47	1.42	79	5.00E-03	311	1.24E-02	307	48	1.27	71	1.00E-02	311	9.72E-03	5.29	6.55E-02	5.71E-03	11	
LS3d(12)	2252000	838374	820666	68	309	47	1.42	79	5.00E-03	312	1.21E-02	309	48	1.27	71	1.00E-02	313	9.54E-03	5.32	6.46E-02	5.69E-03	11	
LS3d(13)	2252000	838373	820657	68	310	47	1.42	79	5.00E-03	314	1.20E-02	310	48	1.27	71	1.00E-02	314	9.43E-03	5.34	6.40E-02	5.68E-03	11	
LS3d(14)	2252000	838370	820649	68	310	47	1.42	79	5.00E-03	314	1.20E-02	310	48	1.27	71	1.00E-02	314	9.43E-03	5.33	6.40E-02	5.68E-03	11	
LS3d(15)	2252000	838365	820641	68	309	47	1.42	79	5.00E-03	312	1.22E-02	309	48	1.27	71	1.00E-02	313	9.55E-03	5.32	6.46E-02	5.69E-03	11	
LS3d(16)	2252000	838360	820635	68	306	47	1.42	79	5.00E-03	310	1.24E-02	306	48	1.27	71	1.00E-02	310	9.77E-03	5.28	6.57E-02	5.72E-03	11	
LS3d(17)	2252000	838353	820629	68	303	47	1.42	79	5.00E-03	306	1.29E-02	303	48	1.26	70	1.00E-02	306	1.01E-02	5.23	6.74E-02	5.75E-03	11	
LS3d(18)	2252000	838345	820625	68	298	47	1.41	79	5.00E-03	301	1.35E-02	298	48	1.26	70	1.00E-02	301	1.06E-02	5.16	6.98E-02	5.80E-03	11	
LS3d(19)	2252000	838337	820622	68	292	47	1.41	79	5.00E-03	296	1.43E-02	292	48	1.25	70	1.00E-02	296	1.12E-02	5.08	7.27E-02	5.85E-03	11	
LS3d(20)	2252000	838328	820620	68	285	47	1.41	79	5.00E-03	289	1.54E-02	285	48	1.25	69	1.00E-02	289	1.20E-02	4.97	7.66E-02	5.92E-03	11	
LS3d(21)	2252000	838320	820620	68	277	47	1.40	78	5.00E-03	281	1.66E-02	277	48	1.24	69	1.00E-02	281	1.30E-02	4.86	8.09E-02	6.00E-03	12	
LS3d(22)	2252000	838311	820620	68	270	47	1.40	78	5.00E-03	274	1.81E-02	270	48	1.23	68	1.00E-02	274	1.41E-02	4.75	8.59E-02	6.07E-03	12	
LS3d(23)	2252000	838302	820622	68	261	47	1.39	78	5.00E-03	266	1.98E-02	261	48	1.22	68	1.00E-02	266	1.53E-02	4.63	9.15E-02	6.16E-03	12	
LS3d(24)	2252000	838294	820624	68	253	47	1.39	77	5.00E-03	257	2.18E-02	253	48	1.21	67	1.00E-02	257	1.68E-02	4.50	9.80E-02	6.24E-03	13	
LS3d(25)	2252000	838286	820627	68	244	47	1.38	77	5.00E-03	249	2.40E-02	244	48	1.20	67	1.00E-02	249	1.85E-02	4.37	1.05E-01	6.33E-03	13	
LS3d(26)	2252000	838278	820632	68	235	47	1.37	77	5.00E-03	240	2.68E-02	235	48	1.18	66	1.00E-02	240	2.06E-02	4.23	1.13E-01	6.42E-03	13	
LS3d(27)	2252000	838268	820630	68	229	47	1.37	76	5.00E-03	233	2.91E-02	229	48	1.17	65	1.00E-02	234	2.23E-02	4.13	1.20E-01	6.49E-03	14	
LS3d(28)	2252000	838259	820639	68	215	47	1.36	76	5.00E-03	221	3.45E-02	215	48	1.15	64	1.00E-02	221	2.62E-02	3.92	1.35E-01	6.62E-03	14	
LS3d(29)	2252000	838242	820659	68	191	47	1.33	74	5.00E-03	197	4.86E-02	191	48	1.11	61	1.00E-02	197	3.64E-02	3.53	1.72E-01	6.86E-03	16	
LS3d(30)	2252000	838230	820682	68	169	47	1.30	72	5.00E-03	175	6.86E-02	169	48	1.06	59	1.00E-02	176	5.03E-02	3.16	2.17E-01	7.06E-03	18	
LS3d(31)	2252000	838221	820706	68	151	47	1.27	71	5.00E-03	158	9.38E-02	151	48	1.01	56	1.00E-02	158	6.73E-02	2.86	2.68E-01	7.19E-03	19	
LS3d(32)	2252000	838216	820731	68	140	47	1.25	69	5.00E-03	147	1.16E-01	140	48	0.97	54	1.00E-02	148	8.18E-02	2.66	3.08E-01	7.26E-03	21	
LS3d(33)	2252000	838220	820756	68	140	47	1.25	69	0.00E+00	148	0.00E+00	140	48	0.97	54	1.00E-02	148	8.13E-02	2.67	0.00E+00	0.00E+00	21	
LS3d(34)	2252000	838227	820781	68	149	47	1.27	71	0.00E+00	157	0.00E+00	149	48	1.00	55	1.00E-02	157	6.91E-02	2.83	0.00E+00	0.00E+00	19	
LS3d(35)	2252000	838238	820803	68	164	47	1.29	72	0.00E+00	171	0.00E+00	164	48	1.04	58	1.00E-02	171	5.45E-02	3.08	0.00E+00	0.00E+00	18	
										sum	7.22E-01											sum	8.32E-01
										sum	7.27E-01											sum	1.10E+00
Light source LS4: Office Block																							
Light Sources drawing are referred to Page 4 in Appendix 11G		LS4a			Light Sources Type				SFC04				Approximate reflectance factor for wall surface				0.6						
LS4a (1)	201600	838176	820441	50	333	29	1.48	83	5.00E-03	334	5.48E-04	333	29	1.40	78	9.00E-01	334	7.12E-02	8.17	4.48E-03	9.20E-04	7	
										sum	5.48E-04											sum	7.12E-02
Light Sources drawing are referred to Page 4 in Appendix 11G		LS4c			Light Sources Type				Approximate reflectance factor for dark stone				0.3										
LS4c (1)	426000	838204	820363	49.5	415	28.5	1.50	84	5.00E-03	416	5.89E-04	415	29	1.43	80	0.00E+00	416	No reflection	9.63	5.67E-03	1.62E-03	6	
LS4c (2)	426000	838204	820348	49.5	429	28.5	1.50	84	5.00E-03	430	5.34E-04	429	29	1.44	80	0.00E+00	430		9.85	5.26E-03	1.56E-03	6	
LS4c (3)	426000	838204	820334	49.5	443	28.5	1.51	84	5.00E-03	444	4.85E-04	443	29	1.44	80	0.00E+00	444		10.05	4.88E-03	1.51E-03	6	
LS4c (4)	284000	838204	820319	49.5	457	28.5	1.51	84	5.00E-03	458	2.95E-04	457	29	1.44	81	0.00E+00	458		10.26	3.03E-03	9.76E-04	6	
										sum	1.90E-03											sum	0.00E+00
										sum	3.00E-03											sum	7.12E-02

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/h)-2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/2h)-2$		Beam factor $\beta=0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{h\text{av}} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	$\tan\Phi$	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_{\text{eye}} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90-\Phi$
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree							
Light source LS6: Podium Deck																						
Light Sources drawing are referred to Page 4 in Appendix 11G		LS6a		Light Sources Type		SFC02		Approximate reflectance factor for Concrete ground 0.4														
LS6a (19)	6890	838591	820421	18	613	3	1.57	88	5.00E-03	613	3.14E-07	613	8	1.54	87	1.00E-02	613	1.34E-06	25.11	7.89E-06	1.52E-05	2
LS6a (20)		838577	820417		603		1.57	88	5.00E-03	604	3.29E-07	603	8	1.54	86	1.00E-02	604	1.40E-06	25.06	8.25E-06	1.58E-05	2
LS6a (21)		838562	820414		594		1.57	88	5.00E-03	594	3.46E-07	594	8	1.54	86	1.00E-02	594	1.47E-06	25.01	8.65E-06	1.65E-05	2
LS6a (22)		838547	820410		583		1.57	88	5.00E-03	583	3.64E-07	583	8	1.54	86	1.00E-02	583	1.55E-06	24.96	9.10E-06	1.73E-05	2
LS6a (23)		838535	820436		558		1.57	88	5.00E-03	558	4.16E-07	558	8	1.54	86	1.00E-02	558	1.77E-06	24.81	1.03E-05	1.94E-05	2
LS6a (24)		838531	820450		547		1.57	88	5.00E-03	547	4.42E-07	547	8	1.54	86	1.00E-02	547	1.88E-06	24.74	1.09E-05	2.04E-05	2
LS6a (25)		838527	820465		536		1.57	88	5.00E-03	536	4.70E-07	536	8	1.54	86	1.00E-02	536	2.00E-06	24.68	1.16E-05	2.15E-05	2
LS6a (26)		838516	820485		515		1.56	88	5.00E-03	515	5.28E-07	515	8	1.54	86	1.00E-02	515	2.25E-06	24.54	1.30E-05	2.38E-05	2
LS6a (28)		838486	820477		495		1.56	88	5.00E-03	495	5.97E-07	495	8	1.54	86	1.00E-02	495	2.54E-06	24.40	1.46E-05	2.64E-05	2
LS6a (30)		838481	820467		496		1.56	88	5.00E-03	496	5.92E-07	496	8	1.54	86	1.00E-02	496	2.52E-06	24.41	1.44E-05	2.62E-05	2
LS6a (31)		838230	820297		486		1.56	88	5.00E-03	486	6.30E-07	486	8	1.54	86	1.00E-02	486	2.69E-06	24.33	1.53E-05	2.77E-05	2
LS6a (32)		838242	820285		501		1.56	88	5.00E-03	501	5.75E-07	501	8	1.54	86	1.00E-02	501	2.45E-06	24.44	1.40E-05	2.56E-05	2
LS6a (33)		838255	820274		516		1.56	88	5.00E-03	516	5.26E-07	516	8	1.54	86	1.00E-02	516	2.24E-06	24.55	1.29E-05	2.37E-05	2
LS6a (34)		838267	820262		531		1.57	88	5.00E-03	531	4.82E-07	531	8	1.54	86	1.00E-02	531	2.06E-06	24.65	1.19E-05	2.20E-05	2
LS6a (35)		838278	820251		546		1.57	88	5.00E-03	546	4.45E-07	546	8	1.54	86	1.00E-02	546	1.90E-06	24.74	1.10E-05	2.05E-05	2
LS6a (36)		838290	820239		561		1.57	88	5.00E-03	561	4.10E-07	561	8	1.54	86	1.00E-02	561	1.75E-06	24.83	1.02E-05	1.91E-05	2
LS6a (37)		838303	820227		577		1.57	88	5.00E-03	577	3.76E-07	577	8	1.54	86	1.00E-02	577	1.61E-06	24.92	9.38E-06	1.78E-05	2
LS6a (38)		838315	820215		593		1.57	88	5.00E-03	593	3.47E-07	593	8	1.54	86	1.00E-02	593	1.48E-06	25.01	8.68E-06	1.66E-05	2
								sum	8.19E-06								sum	3.49E-05				
LS6b(62)	6890	838560	820441	18	576	3	1.57	88	5.00E-03	576	3.79E-07	576	8	1.54	86	1.00E-02	576	1.62E-06	24.91	9.44E-06	1.79E-05	2
LS6b(63)		838564	820425		589		1.57	88	5.00E-03	589	3.55E-07	589	8	1.54	86	1.00E-02	589	1.51E-06	24.98	8.86E-06	1.69E-05	2
LS6b(64)		838567	820387		613		1.57	88	5.00E-03	613	3.14E-07	613	8	1.54	87	1.00E-02	613	1.34E-06	25.11	7.88E-06	1.52E-05	2
LS6b(65)		838575	820375		627		1.57	88	5.00E-03	627	2.93E-07	627	8	1.55	87	1.00E-02	627	1.25E-06	25.18	7.38E-06	1.43E-05	2
LS6b(77)		838487	820426		526		1.57	88	5.00E-03	526	4.96E-07	526	8	1.54	86	1.00E-02	526	2.12E-06	24.61	1.22E-05	2.26E-05	2
LS6b(78)		838478	820442		510		1.56	88	5.00E-03	510	5.46E-07	510	8	1.54	86	1.00E-02	510	2.33E-06	24.50	1.34E-05	2.45E-05	2
LS6b(79)		838469	820456		494		1.56	88	5.00E-03	494	6.01E-07	494	8	1.54	86	1.00E-02	494	2.56E-06	24.39	1.47E-05	2.66E-05	2
LS6b(80)		838471	820475		484		1.56	88	5.00E-03	484	6.38E-07	484	8	1.54	86	1.00E-02	484	2.72E-06	24.31	1.55E-05	2.80E-05	2
LS6b(81)		838456	820472		473		1.56	88	5.00E-03	473	6.84E-07	473	8	1.54	86	1.00E-02	473	2.92E-06	24.23	1.66E-05	2.97E-05	2
LS6b(82)		838448	820487		458		1.56	88	5.00E-03	458	7.52E-07	458	8	1.54	86	1.00E-02	458	3.20E-06	24.11	1.81E-05	3.21E-05	2
LS6b(83)		838445	820504		446		1.56	88	5.00E-03	446	8.16E-07	446	8	1.53	86	1.00E-02	446	3.48E-06	24.01	1.96E-05	3.44E-05	2
LS6b(98)		838278	820271		527		1.57	88	5.00E-03	527	4.95E-07	527	8	1.54	86	1.00E-02	527	2.11E-06	24.62	1.22E-05	2.25E-05	2
LS6b(99)		838271	820284		512		1.56	88	5.00E-03	512	5.39E-07	512	8	1.54	86	1.00E-02	512	2.30E-06	24.52	1.32E-05	2.42E-05	2
LS6b(100)		838257	820284		507		1.56	88	5.00E-03	507	5.56E-07	507	8	1.54	86	1.00E-02	507	2.37E-06	24.48	1.36E-05	2.49E-05	2
LS6b(101)		838263	820300		495		1.56	88	5.00E-03	495	5.98E-07	495	8	1.54	86	1.00E-02	495	2.55E-06	24.39	1.46E-05	2.65E-05	2
LS6b(102)		838245	820296		491		1.56	88	5.00E-03	491	6.10E-07	491	8	1.54	86	1.00E-02	491	2.60E-06	24.37	1.49E-05	2.69E-05	2
LS6b(103)		838258	820320		474		1.56	88	5.00E-03	474	6.81E-07	474	8	1.54	86	1.00E-02	474	2.90E-06	24.23	1.65E-05	2.96E-05	2
LS6b(104)		838256	820344		451		1.56	88	5.00E-03	451	7.89E-07	451	8	1.54	86	1.00E-02	451	3.37E-06	24.05	1.90E-05	3.35E-05	2
LS6b(105)	838242	820355	436	1.56	88	5.00E-03	436	8.73E-07	436	8	1.53	86	1.00E-02	436	3.72E-06	23.92	2.09E-05	3.64E-05	2			
LS6b(106)	838228	820362	424	1.56	88	5.00E-03	424	9.49E-07	424	8	1.53	86	1.00E-02	424	4.05E-06	23.81	2.26E-05	3.91E-05	2			
LS6b(107)	838223	820313	468	1.56	88	5.00E-03	468	7.04E-07	468	8	1.54	86	1.00E-02	469	3.00E-06	24.19	1.70E-05	3.04E-05	2			
LS6b(108)	838235	820308	478	1.56	88	5.00E-03	478	6.64E-07	478	8	1.54	86	1.00E-02	478	2.83E-06	24.26	1.61E-05	2.89E-05	2			
LS6b(109)	838231	820340	446	1.56	88	5.00E-03	446	8.17E-07	446	8	1.53	86	1.00E-02	446	3.48E-06	24.00	1.96E-05	3.44E-05	2			
LS6b(110)	838260	820370	429	1.56	88	5.00E-03	429	9.15E-07	429	8	1.53	86	1.00E-02	429	3.90E-06	23.85	2.18E-05	3.79E-05	2			
LS6b(111)	838246	820373	421	1.56	88	5.00E-03	421	9.72E-07	421	8	1.53	86	1.00E-02	421	4.14E-06	23.77	2.31E-05	3.98E-05	2			
LS6b(112)	838230	820379	409	1.56	88	5.00E-03	409	1.06E-06	409	8	1.53	86	1.00E-02	409	4.51E-06	23.66	2.50E-05	4.27E-05	2			
LS6b(113)	838260	820391	410	1.56	88	5.00E-03	410	1.05E-06	410	8	1.53	86	1.00E-02	410	4.46E-06	23.67	2.48E-05	4.24E-05	2			
LS6b(114)	838244	820390	404	1.56	88	5.00E-03	404	1.10E-06	404	8	1.53	86	1.00E-02	404	4.68E-06	23.61	2.59E-05	4.40E-05	2			
LS6b(115)	838226	820398	390	1.56	88	5.00E-03	390	1.22E-06	390	8	1.53	86	1.00E-02	390	5.18E-06	23.46	2.85E-05	4.79E-05	2			
LS6b(116)	838238	820409	385	1.56	88	5.00E-03	385	1.27E-06	385	8	1.53	86	1.00E-02	385	5.42E-06	23.40	2.98E-05	4.97E-05	2			
LS6b(117)	838253	820409	391	1.56	88	5.00E-03	391	1.21E-06	391	8	1.53	86	1.00E-02	391	5.16E-06	23.47	2.84E-05	4.78E-05	2			
LS6b(118)	838267	820410	397	1.56	88	5.00E-03	397	1.16E-06	397	8	1.53	86	1.00E-02	397	4.94E-06	23.53	2.73E-05	4.61E-05	2			

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaires from the individual luminaires $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaires from the individual luminaires $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{h\text{av}} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan \Phi$	Total Veiling Luminance from all luminaires $L_v = \sum 10 (E_{\text{eye}} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/h	Φ Degree							
LS6b(119)	6890	838270	820426	18	384	3	1.56	88	5.00E-03	384	1.28E-06	384	8	1.53	86	1.00E-02	384	5.44E-06	23.39	2.99E-05	4.99E-05	2
LS6b(120)		838241	820423		373		1.56	88	5.00E-03	373	1.39E-06	373	8	1.53	86	1.00E-02	373	5.94E-06	23.27	3.24E-05	5.36E-05	2
LS6b(121)		838254	820432		371		1.56	88	5.00E-03	371	1.41E-06	371	8	1.53	86	1.00E-02	371	6.02E-06	23.25	3.29E-05	5.42E-05	2
LS6b(122)		838282	820444		375		1.56	88	5.00E-03	375	1.38E-06	375	8	1.53	86	1.00E-02	375	5.86E-06	23.29	3.20E-05	5.30E-05	2
LS6b(123)		838266	820447		364		1.56	88	5.00E-03	364	1.51E-06	364	8	1.53	85	1.00E-02	364	6.42E-06	23.16	3.49E-05	5.70E-05	2
LS6b(124)		838253	820451		354		1.56	88	5.00E-03	354	1.63E-06	354	8	1.53	85	1.00E-02	354	6.96E-06	23.04	3.76E-05	6.09E-05	2
LS6b(125)		838295	820460		369		1.56	88	5.00E-03	369	1.44E-06	369	8	1.53	86	1.00E-02	369	6.15E-06	23.22	3.35E-05	5.51E-05	2
LS6b(126)		838273	820465		352		1.56	88	5.00E-03	352	1.66E-06	352	8	1.53	85	1.00E-02	352	7.07E-06	23.01	3.82E-05	6.17E-05	2
LS6b(127)		838258	820471		339		1.56	87	5.00E-03	339	1.85E-06	339	8	1.52	85	1.00E-02	339	7.89E-06	22.84	4.23E-05	6.74E-05	3
LS6b(128)		838288	820472		355		1.56	88	5.00E-03	355	1.62E-06	355	8	1.53	85	1.00E-02	355	6.91E-06	23.05	3.74E-05	6.05E-05	2
LS6b(129)		838304	820478		359		1.56	88	5.00E-03	359	1.56E-06	359	8	1.53	85	1.00E-02	359	6.65E-06	23.10	3.61E-05	5.87E-05	2
LS6b(130)		838318	820486		362		1.56	88	5.00E-03	362	1.52E-06	362	8	1.53	85	1.00E-02	362	6.49E-06	23.14	3.52E-05	5.76E-05	2
LS6b(131)		838338	820495		369		1.56	88	5.00E-03	369	1.43E-06	369	8	1.53	86	1.00E-02	370	6.11E-06	23.23	3.33E-05	5.48E-05	2
LS6b(132)		838353	820504		374		1.56	88	5.00E-03	374	1.39E-06	374	8	1.53	86	1.00E-02	374	5.91E-06	23.28	3.23E-05	5.33E-05	2
LS6b(133)		838377	820501		394		1.56	88	5.00E-03	394	1.18E-06	394	8	1.53	86	1.00E-02	394	5.03E-06	23.51	2.77E-05	4.68E-05	2
LS6b(134)		838404	820495		418		1.56	88	5.00E-03	418	9.89E-07	418	8	1.53	86	1.00E-02	418	4.21E-06	23.75	2.35E-05	4.04E-05	2
LS6b(135)		838419	820491		433		1.56	88	5.00E-03	433	8.94E-07	433	8	1.53	86	1.00E-02	433	3.81E-06	23.89	2.13E-05	3.71E-05	2
LS6b(136)		838436	820484		450		1.56	88	5.00E-03	450	7.93E-07	450	8	1.54	86	1.00E-02	450	3.38E-06	24.04	1.91E-05	3.36E-05	2
LS6b(137)		838433	820501		438		1.56	88	5.00E-03	438	8.62E-07	438	8	1.53	86	1.00E-02	438	3.68E-06	23.93	2.06E-05	3.61E-05	2
LS6b(138)		838416	820507		420		1.56	88	5.00E-03	420	9.73E-07	420	8	1.53	86	1.00E-02	421	4.15E-06	23.77	2.31E-05	3.99E-05	2
LS6b(139)		838396	820512		401		1.56	88	5.00E-03	401	1.12E-06	401	8	1.53	86	1.00E-02	401	4.77E-06	23.58	2.64E-05	4.47E-05	2
LS6b(140)		838371	820515		380		1.56	88	5.00E-03	380	1.31E-06	380	8	1.53	86	1.00E-02	380	5.60E-06	23.35	3.07E-05	5.11E-05	2
LS6b(141)		838350	820524		358		1.56	88	5.00E-03	358	1.57E-06	358	8	1.53	85	1.00E-02	359	6.69E-06	23.09	3.63E-05	5.90E-05	2
LS6b(142)		838326	820510		350		1.56	88	5.00E-03	350	1.68E-06	350	8	1.53	85	1.00E-02	351	7.16E-06	22.99	3.86E-05	6.23E-05	2
LS6b(143)		838310	820503		344		1.56	88	5.00E-03	344	1.77E-06	344	8	1.52	85	1.00E-02	344	7.55E-06	22.91	4.06E-05	6.50E-05	2
LS6b(144)		838297	820495		342		1.56	87	5.00E-03	342	1.80E-06	342	8	1.52	85	1.00E-02	343	7.67E-06	22.89	4.12E-05	6.59E-05	3
LS6b(145)		838284	820490		337		1.56	87	5.00E-03	337	1.88E-06	337	8	1.52	85	1.00E-02	338	8.02E-06	22.82	4.29E-05	6.82E-05	3
LS6b(146)		838268	820486		332		1.56	87	5.00E-03	332	1.98E-06	332	8	1.52	85	1.00E-02	332	8.44E-06	22.74	4.51E-05	7.11E-05	3
LS6b(147)		838260	820506		311		1.56	87	5.00E-03	311	2.40E-06	311	8	1.52	85	1.00E-02	311	1.02E-05	22.43	5.39E-05	8.27E-05	3
LS6b(148)		838275	820507		319		1.56	87	5.00E-03	319	2.23E-06	319	8	1.52	85	1.00E-02	319	9.50E-06	22.55	5.03E-05	7.81E-05	3
LS6b(149)		838289	820510		325		1.56	87	5.00E-03	325	2.10E-06	325	8	1.52	85	1.00E-02	325	8.95E-06	22.65	4.76E-05	7.44E-05	3
LS6b(150)		838302	820519		327		1.56	87	5.00E-03	327	2.06E-06	327	8	1.52	85	1.00E-02	327	8.78E-06	22.68	4.67E-05	7.33E-05	3
LS6b(151)		838314	820527		330		1.56	87	5.00E-03	330	2.02E-06	330	8	1.52	85	1.00E-02	330	8.61E-06	22.71	4.59E-05	7.22E-05	3
LS6b(152)		838334	820529		343		1.56	87	5.00E-03	343	1.79E-06	343	8	1.52	85	1.00E-02	343	7.64E-06	22.89	4.10E-05	6.56E-05	3
LS6b(153)		838368	820533		367		1.56	88	5.00E-03	367	1.46E-06	367	8	1.53	86	1.00E-02	367	6.24E-06	23.20	3.40E-05	5.58E-05	2
LS6b(154)		838385	820544		373		1.56	88	5.00E-03	373	1.39E-06	373	8	1.53	86	1.00E-02	374	5.92E-06	23.27	3.23E-05	5.34E-05	2
LS6b(155)		838388	820527		386		1.56	88	5.00E-03	386	1.25E-06	386	8	1.53	86	1.00E-02	386	5.35E-06	23.42	2.94E-05	4.92E-05	2
LS6b(156)		838401	820542		388		1.56	88	5.00E-03	388	1.24E-06	388	8	1.53	86	1.00E-02	388	5.29E-06	23.44	2.91E-05	4.87E-05	2
LS6b(157)		838408	820524		404		1.56	88	5.00E-03	404	1.10E-06	404	8	1.53	86	1.00E-02	404	4.69E-06	23.60	2.60E-05	4.41E-05	2
LS6b(158)		838416	820537		403		1.56	88	5.00E-03	403	1.10E-06	403	8	1.53	86	1.00E-02	404	4.70E-06	23.60	2.60E-05	4.42E-05	2
LS6b(166)		838335	820546		333		1.56	87	5.00E-03	333	1.97E-06	333	8	1.52	85	1.00E-02	333	8.38E-06	22.75	4.48E-05	7.07E-05	3
LS6b(167)		838319	820546		321		1.56	87	5.00E-03	321	2.20E-06	321	8	1.52	85	1.00E-02	321	9.36E-06	22.58	4.96E-05	7.71E-05	3
LS6b(168)		838304	820542		312		1.56	87	5.00E-03	312	2.39E-06	312	8	1.52	85	1.00E-02	312	1.02E-05	22.44	5.36E-05	8.23E-05	3
LS6b(169)		838294	820533		311		1.56	87	5.00E-03	311	2.40E-06	311	8	1.52	85	1.00E-02	311	1.02E-05	22.43	5.39E-05	8.27E-05	3
LS6b(170)		838280	820528		306		1.56	87	5.00E-03	306	2.52E-06	306	8	1.52	85	1.00E-02	306	1.07E-05	22.35	5.64E-05	8.59E-05	3
LS6b(171)		838264	820525		298		1.56	87	5.00E-03	298	2.73E-06	298	8	1.52	85	1.00E-02	298	1.16E-05	22.22	6.07E-05	9.15E-05	3
LS6b(172)		838353	820559		339		1.56	87	5.00E-03	339	1.86E-06	339	8	1.52	85	1.00E-02	339	7.94E-06	22.83	4.25E-05	6.77E-05	3
LS6b(173)		838334	820567		319		1.56	87	5.00E-03	319	2.24E-06	319	8	1.52	85	1.00E-02	319	9.52E-06	22.55	5.04E-05	7.82E-05	3
LS6b(174)		838318	820563		309		1.56	87	5.00E-03	309	2.46E-06	309	8	1.52	85	1.00E-02	309	1.05E-05	22.40	5.50E-05	8.42E-05	3
LS6b(175)		838305	820559		301		1.56	87	5.00E-03	301	2.64E-06	301	8	1.52	85	1.00E-02	302	1.12E-05	22.28	5.88E-05	8.90E-05	3
LS6b(176)		838290	820558		291		1.56	87	5.00E-03	291	2.94E-06	291	8	1.52	85	1.00E-02	291	1.25E-05	22.10	6.50E-05	9.68E-05	3
LS6b(177)		838282	820546		294		1.56	87	5.00E-03	294	2.84E-06	294	8	1.52	85	1.00E-02	294	1.21E-05	22.16	6.28E-05	9.41E-05	3
LS6b(178)		838269	820543		288		1.56	87	5.00E-03	288	3.04E-06	288	8	1.52	85	1.00E-02	288	1.29E-05	22.04	6.70E-05	9.93E-05	3
LS6b(179)		838255	820541		280		1.56	87	5.00E-03	280	3.30E-06	280	8	1.51	85	1.00E-02	280	1.41E-05	21.90	7.24E-05	1.06E-04	3
LS6b(180)		838257	820557		269		1.56	87	5.00E-													

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaires from the individual luminaires $\Phi = \arctan(d/h)-2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaires $\Phi = \arctan(d/2h)-2$		Beam factor $\beta=0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{h\text{av}} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan \Phi$	Total Veiling Luminance from all luminaires $L_v = \sum 10 (E_{\text{eye}} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90-\Phi$
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree							
LS6b(181)	6890	838276	820563	18	277	3	1.56	87	5.00E-03	277	3.40E-06	277	8	1.51	85	1.00E-02	277	1.45E-05	21.85	7.43E-05	1.08E-04	3
LS6b(182)		838296	820576		283		1.56	87	5.00E-03	283	3.18E-06	283	8	1.51	85	1.00E-02	283	1.36E-05	21.96	6.99E-05	1.03E-04	3
LS6b(183)		838315	820583		294		1.56	87	5.00E-03	294	2.85E-06	294	8	1.52	85	1.00E-02	294	1.21E-05	22.15	6.32E-05	9.46E-05	3
LS6b(184)		838331	820582		307		1.56	87	5.00E-03	307	2.50E-06	307	8	1.52	85	1.00E-02	307	1.06E-05	22.37	5.59E-05	8.53E-05	3
LS6b(192)		838268	820590		253		1.56	87	5.00E-03	253	4.45E-06	253	8	1.51	84	1.00E-02	253	1.90E-05	21.37	9.52E-05	1.33E-04	3
LS6b(193)		838274	820609		246		1.56	87	5.00E-03	246	4.87E-06	246	8	1.51	84	1.00E-02	246	2.07E-05	21.21	1.03E-04	1.42E-04	3
LS6b(194)		838256	820600		237		1.56	87	5.00E-03	237	5.42E-06	237	8	1.50	84	1.00E-02	237	2.31E-05	21.01	1.14E-04	1.53E-04	3
LS6b(196)		838243	820565		254		1.56	87	5.00E-03	254	4.41E-06	254	8	1.51	84	1.00E-02	254	1.88E-05	21.39	9.44E-05	1.32E-04	3
LS6b(197)		838235	820576		240		1.56	87	5.00E-03	240	5.22E-06	240	8	1.50	84	1.00E-02	240	2.22E-05	21.08	1.10E-04	1.49E-04	3
LS6b(198)		838240	820592		232		1.56	87	5.00E-03	232	5.81E-06	232	8	1.50	84	1.00E-02	232	2.47E-05	20.88	1.21E-04	1.61E-04	3
LS6b(199)		838244	820611		221		1.56	87	5.00E-03	221	6.70E-06	221	8	1.50	84	1.00E-02	221	2.85E-05	20.61	1.38E-04	1.79E-04	3
LS6b(200)		838234	820624		205		1.56	87	5.00E-03	205	8.39E-06	205	8	1.49	84	1.00E-02	205	3.57E-05	20.17	1.69E-04	2.10E-04	3
LS6b(201)		838231	820605		216		1.56	87	5.00E-03	216	7.14E-06	216	8	1.50	84	1.00E-02	216	3.04E-05	20.49	1.46E-04	1.87E-04	3
LS6b(202)		838223	820585		226		1.56	87	5.00E-03	226	6.30E-06	226	8	1.50	84	1.00E-02	226	2.68E-05	20.73	1.31E-04	1.71E-04	3
LS6b(203)		838216	820571		233		1.56	87	5.00E-03	233	5.75E-06	233	8	1.50	84	1.00E-02	233	2.44E-05	20.90	1.20E-04	1.60E-04	3
LS6b(204)		838209	820588		215		1.56	87	5.00E-03	215	7.30E-06	215	8	1.50	84	1.00E-02	215	3.10E-05	20.45	1.49E-04	1.90E-04	3
LS6b(205)		838215	820600		208		1.56	87	5.00E-03	209	7.98E-06	208	8	1.49	84	1.00E-02	209	3.39E-05	20.27	1.62E-04	2.03E-04	3
LS6b(206)		838215	820616		197		1.56	87	5.00E-03	197	9.44E-06	197	8	1.49	83	1.00E-02	197	4.01E-05	19.93	1.88E-04	2.28E-04	3
LS6b(207)		838212	820633		183		1.55	87	5.00E-03	183	1.18E-05	183	8	1.48	83	1.00E-02	183	5.00E-05	19.48	2.30E-04	2.66E-04	3
LS6b(208)		838206	820648		168		1.55	87	5.00E-03	168	1.53E-05	168	8	1.48	83	1.00E-02	168	6.49E-05	18.93	2.90E-04	3.17E-04	3
LS6b(209)		838200	820662		155		1.55	87	5.00E-03	155	1.95E-05	155	8	1.47	82	1.00E-02	155	8.26E-05	18.40	3.59E-04	3.71E-04	3
LS6b(210)		838196	820675		143		1.55	87	5.00E-03	143	2.46E-05	143	8	1.46	82	1.00E-02	144	1.04E-04	17.89	4.40E-04	4.29E-04	3
LS6b(211)		838191	820690		131		1.55	87	5.00E-03	131	3.22E-05	131	8	1.45	81	1.00E-02	131	1.36E-04	17.28	5.56E-04	5.07E-04	3
LS6b(212)		838186	820704		120		1.55	87	5.00E-03	120	4.23E-05	120	8	1.44	80	1.00E-02	120	1.78E-04	16.65	7.04E-04	5.96E-04	3
LS6b(213)		838180	820719		108		1.54	86	5.00E-03	108	5.70E-05	108	8	1.42	80	9.00E-01	109	2.16E-02	15.95	9.09E-04	7.06E-04	4
LS6b(214)		838182	820734		105		1.54	86	5.00E-03	105	6.24E-05	105	8	1.42	79	9.00E-01	105	2.36E-02	15.74	9.81E-04	7.42E-04	4
LS6b(215)		838164	820729		90		1.54	86	5.00E-03	90	1.00E-04	90	8	1.39	78	9.00E-01	90	3.77E-02	14.60	1.46E-03	9.55E-04	4
LS6b(216)		838157	820743		79		1.53	86	5.00E-03	79	1.46E-04	79	8	1.37	77	9.00E-01	79	5.45E-02	13.71	2.00E-03	1.15E-03	4
LS6b(217)		838181	820750		102		1.54	86	5.00E-03	102	6.81E-05	102	8	1.42	79	9.00E-01	102	2.57E-02	15.53	1.06E-03	7.79E-04	4
LS6b(218)		838139	820413		352		1.56	88	5.00E-03	352	1.66E-06	352	8	1.53	85	1.00E-02	352	7.09E-06	23.01	3.83E-05	6.18E-05	2
LS6b(219)		838127	820421		341		1.56	87	5.00E-03	341	1.82E-06	341	8	1.52	85	1.00E-02	342	7.74E-06	22.87	4.16E-05	6.63E-05	3
LS6b(220)		838114	820429		332		1.56	87	5.00E-03	332	1.98E-06	332	8	1.52	85	1.00E-02	332	8.44E-06	22.74	4.50E-05	7.10E-05	3
LS6a(246)		838281	820581		269		1.56	87	5.00E-03	269	3.72E-06	269	8	1.51	85	1.00E-02	269	1.58E-05	21.70	8.07E-05	1.16E-04	3
LS6a(247)		838263	820571		263		1.56	87	5.00E-03	263	4.00E-06	263	8	1.51	85	1.00E-02	263	1.70E-05	21.57	8.62E-05	1.22E-04	3
LS6a(248)		838243	820565		254		1.56	87	5.00E-03	254	4.41E-06	254	8	1.51	84	1.00E-02	254	1.88E-05	21.39	9.44E-05	1.32E-04	3
LS6a(249)		838274	820609		245		1.56	87	5.00E-03	245	4.90E-06	245	8	1.51	84	1.00E-02	245	2.09E-05	21.20	1.04E-04	1.42E-04	3
LS6a(250)		838268	820590		253		1.56	87	5.00E-03	253	4.45E-06	253	8	1.51	84	1.00E-02	253	1.90E-05	21.37	9.52E-05	1.33E-04	3
LS6a(251)		838251	820582		247		1.56	87	5.00E-03	247	4.80E-06	247	8	1.51	84	1.00E-02	247	2.04E-05	21.24	1.02E-04	1.40E-04	3
LS6a(252)		838235	820575		241		1.56	87	5.00E-03	241	5.19E-06	241	8	1.50	84	1.00E-02	241	2.21E-05	21.09	1.09E-04	1.49E-04	3
LS6a(253)		838256	820600		237		1.56	87	5.00E-03	237	5.42E-06	237	8	1.50	84	1.00E-02	237	2.31E-05	21.01	1.14E-04	1.53E-04	3
LS6a(254)		838240	820592		232		1.56	87	5.00E-03	232	5.81E-06	232	8	1.50	84	1.00E-02	232	2.47E-05	20.88	1.21E-04	1.61E-04	3
LS6a(255)		838222	820585		226		1.56	87	5.00E-03	226	6.30E-06	226	8	1.50	84	1.00E-02	226	2.68E-05	20.73	1.31E-04	1.71E-04	3
LS6a(257)		838216	820571		233		1.56	87	5.00E-03	233	5.75E-06	233	8	1.50	84	1.00E-02	233	2.44E-05	20.90	1.20E-04	1.60E-04	3
LS6a(258)		838244	820611		221		1.56	87	5.00E-03	221	6.70E-06	221	8	1.50	84	1.00E-02	221	2.85E-05	20.61	1.38E-04	1.79E-04	3
LS6a(259)		838231	820605		216		1.56	87	5.00E-03	216	7.14E-06	216	8	1.50	84	1.00E-02	216	3.04E-05	20.49	1.46E-04	1.87E-04	3
LS6a(260)		838215	820600		208		1.56	87	5.00E-03	209	7.98E-06	208	8	1.49	84	1.00E-02	209	3.39E-05	20.27	1.62E-04	2.03E-04	3
LS6a(261)		838234	820624		205		1.56	87	5.00E-03	205	8.38E-06	205	8	1.49	84	1.00E-02	205	3.56E-05	20.17	1.69E-04	2.10E-04	3
LS6a(262)		838212	820633		183		1.55	87	5.00E-03	183	1.18E-05	183	8	1.48	83	1.00E-02	183	5.00E-05	19.48	2.30E-04	2.66E-04	3
LS6a(263)		838215	820616		197		1.56	87	5.00E-03	197	9.44E-06	197	8	1.49	83	1.00E-02	197	4.01E-05	19.93	1.88E-04	2.28E-04	3
LS6a(264)		838206	820648		168		1.55	87	5.00E-03	168	1.53E-05	168	8	1.48	83	1.00E-02	168	6.49E-05	18.93	2.90E-04	3.17E-04	3
LS6a(265)		838200	820662		155		1.55	87	5.00E-03	155	1.95E-05	155	8	1.47	82	1.00E-02	155	8.26E-05	18.40	3.59E-04	3.71E-04	3
LS6a(266)		838197	820676		144		1.55	87	5.00E-03	144	2.43E-05	144	8	1.46	82	1.00E-02	144	1.03E-04	17.91	4.36E-04	4.27E-04	3
LS6a(267)		838190	820690		131		1.55	87	5.00E-03	131	3.25E-05	131	8	1.45	81	1.00E-02	131	1.37E-04	17.26	5.60E-04	5.10E-04	3
LS6a(268)		838186	820704		120		1.55	87	5.00E-03	120	4.23E-05	120	8	1.44	80	1.00E-02	120	1.78E-04	16.65	7.04E-04	5.96E-04	3
LS6a(269)		838180	820719		108		1.54	86	5.00E-03	108												

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/2h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_{vl} = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$	
							d/h	Φ Degree						d/2h	Φ Degree								
		X (m)	Y (m)	Z (mPD)																			
LS6a (270)		838182	820734		105		1.54	86	5.00E-03	105	6.24E-05	105	8	1.42	79	9.00E-01	105	2.36E-02	15.74	9.81E-04	7.42E-04	4	
LS6a (271)		838164	820729		90		1.54	86	5.00E-03	90	1.00E-04	90	8	1.39	78	9.00E-01	90	3.77E-02	14.60	1.46E-03	9.55E-04	4	
LS6a (272)		838181	820750		102		1.54	86	5.00E-03	102	6.85E-05	102	8	1.41	79	9.00E-01	102	2.59E-02	15.51	1.06E-03	7.81E-04	4	
LS6a (273)		838157	820743		79		1.53	86	5.00E-03	79	1.46E-04	79	8	1.37	77	9.00E-01	79	5.45E-02	13.71	2.00E-03	1.15E-03	4	
LS6a (274)		838180	820766		100		1.54	86	5.00E-03	100	7.15E-05	100	8	1.41	79	9.00E-01	101	2.70E-02	15.41	1.10E-03	8.00E-04	4	
LS6a (275)		838184	820781		106		1.54	86	5.00E-03	106	6.01E-05	106	8	1.42	79	9.00E-01	107	2.27E-02	15.82	9.52E-04	7.28E-04	4	
LS6a (276)		838200	820784		123		1.55	87	5.00E-03	123	3.87E-05	123	8	1.44	81	1.00E-02	123	1.63E-04	16.86	6.52E-04	5.66E-04	3	
LS6a (277)		838191	820795		117		1.55	87	5.00E-03	117	4.55E-05	117	8	1.43	80	1.00E-02	117	1.92E-04	16.48	7.50E-04	6.22E-04	3	
LS6a (279)		838139	820413		352		1.56	88	5.00E-03	352	1.66E-06	352	8	1.53	85	1.00E-02	352	7.09E-06	23.01	3.83E-05	6.18E-05	2	
LS6a (280)		838127	820421		341		1.56	87	5.00E-03	341	1.82E-06	341	8	1.52	85	1.00E-02	341	7.75E-06	22.87	4.16E-05	6.64E-05	3	
LS6a (281)		838114	820429		332		1.56	87	5.00E-03	332	1.98E-06	332	8	1.52	85	1.00E-02	332	8.44E-06	22.74	4.50E-05	7.10E-05	3	
LS6a (282)		838007	820531		240		1.56	87	5.00E-03	240	5.24E-06	240	8	1.50	84	1.00E-02	240	2.23E-05	21.08	1.10E-04	1.50E-04	3	
LS6a (283)		837999	820544		230		1.56	87	5.00E-03	230	5.94E-06	230	8	1.50	84	1.00E-02	230	2.53E-05	20.84	1.24E-04	1.64E-04	3	
LS6a (285)		837999	820571		205		1.56	87	5.00E-03	205	8.42E-06	205	8	1.49	84	1.00E-02	205	3.58E-05	20.16	1.70E-04	2.11E-04	3	
LS6a (286)		837992	820557		220		1.56	87	5.00E-03	220	6.76E-06	220	8	1.50	84	1.00E-02	220	2.88E-05	20.59	1.39E-04	1.80E-04	3	
LS6a (287)		837979	820562		222		1.56	87	5.00E-03	222	6.64E-06	222	8	1.50	84	1.00E-02	222	2.82E-05	20.63	1.37E-04	1.78E-04	3	
LS6a (289)		837985	820575		208		1.56	87	5.00E-03	208	8.07E-06	208	8	1.49	84	1.00E-02	208	3.43E-05	20.25	1.63E-04	2.04E-04	3	
LS6a (290)		837997	820586		192		1.56	87	5.00E-03	192	1.02E-05	192	8	1.49	83	1.00E-02	192	4.35E-05	19.77	2.03E-04	2.42E-04	3	
sum										1.76E-03	sum										3.79E-01		
sum										1.76E-03	sum										3.79E-01		
Light source LS7: Road Lighting																							
Approximate reflectance factor for concrete ground 0.4																							
L05T	149448.0254	-	-	6	1100	15	1.56	87	0.00E+00	1100	0.00E+00	1100	15	1.56	87	1.00E+00	1100	1.68E-03	20.58	0.00E+00	0.00E+00	3	
L07T	96474.6094	-	-		1100		1.56	87	0.00E+00	1100	0.00E+00	1100		1.56	87	1.00E+00	1100	1.09E-03	20.58	0.00E+00	0.00E+00	3	
L06T	94163.3438	-	-		500		1.54	86	0.00E+00	500	0.00E+00	500		1.54	86	1.00E+00	500	1.13E-02	15.39	0.00E+00	0.00E+00	4	
sum										0.00E+00	sum										1.41E-02		
Light source LS8: Ancillary Building																							
Approximate reflectance factor for concrete ground 0.4																							
LR25	375000	838497	820813	50	420	29	1.50	84	0.00E+00	420	0.00E+00	420	29	1.50	84	1.00E+00	421	1.45E-01	9.60	0.00E+00	0.00E+00	6	
LR22	320000	837884	820306	50	494	29	1.51	85	0.00E+00	494	0.00E+00	494	29	1.51	85	1.00E+00	494	7.68E-02	10.65	0.00E+00	0.00E+00	5	
sum										0.00E+00	sum										1.45E-01		
Total sum										7.32E-01	sum										2.80E+00	2.95E+00	2.25E-01

Ehav	Lvl	Lve = 0.035p Ehav / π	Glare rating=27 + 24 log10 (Lvl/Lve)^0.9
2.80E+00	2.25E-01	0.0249	46

Glare impact calculation to Light Sensitivity Receiver L14R

Future Grid Development at Northeast of MPSC

Sensitivity Receiver L14R Coordinate		
X (m)	Y (m)	Z (mPD)
838513	820797	21

The inverse square law and cosine law can be used to calculate illuminance at a point from intensity data.

$$\text{horizontal illuminance (lx) } E_h = (r \times f \times \beta \times I \times \cos\theta) / d^2$$

where I is intensity of lighting source (cd),

β is beam

factor

d is the distance from the light source to sensitive receiver (m),

θ is the angle of incidence of the intensity of a light source,

f is maintenance factor= 0.7

r is Approximate reflectance
 for concrete ground= 0.4
 for wall surface= 0.6
 for grass= 0.2

Direct Light										Reflected light					Illuminance at the observer's eye in a plane perpendicular to the line of sight caused by the lighting installation E eye							
Light source LS1: Main Stadium																						
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1a	Light Sources Type	SFC02	Approximate reflectance factor for concrete ground										0.4							
Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/2/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_{vl} = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree							
LS1a (1)	6890	838277	820404	18	459	3	1.56	88	5.00E-03	459	7.50E-07	459	1.56	87	1.00E-02	459	1.20E-06	24.11	1.81E-05	3.21E-05	2	
LS1a (2)		838283	820418		444		1.56	88	5.00E-03	444	8.29E-07	444	1.56	87	1.00E-02	444	1.33E-06	23.98	1.99E-05	3.49E-05	2	
LS1a (3)		838290	820431		428		1.56	88	5.00E-03	428	9.21E-07	428	1.56	87	1.00E-02	428	1.47E-06	23.85	2.20E-05	3.81E-05	2	
LS1a (4)		838300	820443		413		1.56	88	5.00E-03	413	1.03E-06	413	1.56	87	1.00E-02	413	1.64E-06	23.70	2.43E-05	4.17E-05	2	
LS1a (5)		838310	820455		398		1.56	88	5.00E-03	398	1.15E-06	398	1.56	87	1.00E-02	398	1.84E-06	23.55	2.70E-05	4.57E-05	2	
LS1a (6)		838322	820465		384		1.56	88	5.00E-03	384	1.28E-06	384	1.56	87	1.00E-02	384	2.05E-06	23.39	3.00E-05	5.00E-05	2	
LS1a (7)		838335	820472		370		1.56	88	5.00E-03	370	1.42E-06	370	1.55	87	1.00E-02	370	2.28E-06	23.24	3.31E-05	5.45E-05	2	
LS1a (8)		838349	820478		359		1.56	88	5.00E-03	359	1.57E-06	359	1.55	87	1.00E-02	359	2.51E-06	23.10	3.62E-05	5.89E-05	2	
LS1a (9)		838364	820482		349		1.56	88	5.00E-03	349	1.70E-06	349	1.55	87	1.00E-02	349	2.73E-06	22.97	3.91E-05	6.30E-05	2	
LS1a (10)		838379	820483		341		1.56	87	5.00E-03	341	1.82E-06	341	1.55	87	1.00E-02	341	2.91E-06	22.87	4.16E-05	6.64E-05	3	
LS1a (11)		838394	820482		337		1.56	87	5.00E-03	337	1.89E-06	337	1.55	87	1.00E-02	337	3.03E-06	22.81	4.32E-05	6.86E-05	3	
LS1a (12)		838408	820479		335		1.56	87	5.00E-03	335	1.92E-06	335	1.55	87	1.00E-02	335	3.08E-06	22.79	4.38E-05	6.94E-05	3	
LS1a (13)		838422	820474		336		1.56	87	5.00E-03	336	1.91E-06	336	1.55	87	1.00E-02	336	3.06E-06	22.80	4.35E-05	6.90E-05	3	
LS1a (14)		838435	820466		340		1.56	87	5.00E-03	340	1.84E-06	340	1.55	87	1.00E-02	340	2.95E-06	22.85	4.21E-05	6.71E-05	3	
LS1a (15)		838446	820457		347		1.56	88	5.00E-03	347	1.74E-06	347	1.55	87	1.00E-02	347	2.78E-06	22.94	3.99E-05	6.40E-05	2	
LS1a (16)		838457	820446		355		1.56	88	5.00E-03	355	1.61E-06	355	1.55	87	1.00E-02	355	2.58E-06	23.06	3.71E-05	6.02E-05	2	
LS1a (17)		838466	820434		366		1.56	88	5.00E-03	366	1.48E-06	366	1.55	87	1.00E-02	366	2.37E-06	23.18	3.43E-05	5.62E-05	2	
LS1a (18)		838474	820422		377		1.56	88	5.00E-03	377	1.35E-06	377	1.55	87	1.00E-02	377	2.15E-06	23.32	3.14E-05	5.21E-05	2	
LS1a (19)		838481	820408		390		1.56	88	5.00E-03	390	1.22E-06	390	1.56	87	1.00E-02	390	1.95E-06	23.46	2.85E-05	4.79E-05	2	
LS1a (20)		838485	820394		404		1.56	88	5.00E-03	404	1.09E-06	404	1.56	87	1.00E-02	404	1.75E-06	23.61	2.58E-05	4.39E-05	2	
LS1a (21)		838486	820378		420		1.56	88	5.00E-03	420	9.80E-07	420	1.56	87	1.00E-02	420	1.57E-06	23.76	2.33E-05	4.01E-05	2	
LS1a (22)		838486	820363		435		1.56	88	5.00E-03	435	8.81E-07	435	1.56	87	1.00E-02	435	1.41E-06	23.90	2.11E-05	3.67E-05	2	

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h)-2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h)-2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$	
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree								
LS1a (23)		838486	820348		450		1.56	88	5.00E-03	450	7.95E-07	450		1.56	87	1.00E-02	450	1.27E-06	24.04	1.91E-05	3.37E-05	2	
LS1a (24)		838486	820333		465		1.56	88	5.00E-03	465	7.20E-07	465		1.56	87	1.00E-02	465	1.15E-06	24.16	1.74E-05	3.10E-05	2	
LS1a (25)		838485	820318		480		1.56	88	5.00E-03	480	6.55E-07	480		1.56	87	1.00E-02	480	1.05E-06	24.28	0.00E+00	0.00E+00	2	
LS1a (26)		838481	820303		495		1.56	88	5.00E-03	495	5.97E-07	495		1.56	87	1.00E-02	495	9.56E-07	24.39	1.46E-05	2.64E-05	2	
LS1a (27)		838475	820290		509		1.56	88	5.00E-03	509	5.49E-07	509		1.56	87	1.00E-02	509	8.79E-07	24.49	1.35E-05	2.46E-05	2	
LS1a (28)		838467	820276		523		1.57	88	5.00E-03	523	5.07E-07	523		1.56	87	1.00E-02	523	8.11E-07	24.59	1.25E-05	2.30E-05	2	
LS1a (29)		838458	820264		535		1.57	88	5.00E-03	535	4.71E-07	535		1.56	87	1.00E-02	535	7.54E-07	24.67	1.16E-05	2.16E-05	2	
sum											3.47E-05	sum											5.55E-05
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1b	Light Sources Type		SFC10	Approximate reflectance factor for wall surface			0.6														
LS1b (1)	272000	838277	820404	40	459	19	1.53	86	No direct light	459	No direct light	462	19	1.49	83	1.00E-02	462	4.39E-04	13.08	0.00E+00	0.00E+00	4	
LS1b (2)		838283	820418		444		1.53	86		444		447		1.49	83	1.00E-02	447	4.85E-04	12.84	0.00E+00	0.00E+00	4	
LS1b (3)		838290	820431		428		1.53	85		429		431		1.48	83	1.00E-02	432	5.38E-04	12.59	0.00E+00	0.00E+00	5	
LS1b (4)		838300	820443		413		1.52	85		414		416		1.48	83	1.00E-02	417	5.99E-04	12.34	0.00E+00	0.00E+00	5	
LS1b (5)		838310	820455		398		1.52	85		398		401		1.48	83	1.00E-02	401	6.69E-04	12.08	0.00E+00	0.00E+00	5	
LS1b (6)		838322	820465		384		1.52	85		384		387		1.47	82	1.00E-02	387	7.45E-04	11.82	0.00E+00	0.00E+00	5	
LS1b (7)		838335	820472		370		1.52	85		371		373		1.47	82	1.00E-02	374	8.27E-04	11.58	0.00E+00	0.00E+00	5	
LS1b (8)		838349	820478		359		1.52	85		359		362		1.47	82	1.00E-02	362	9.10E-04	11.36	0.00E+00	0.00E+00	5	
LS1b (9)		838364	820482		349		1.52	85		349		352		1.46	82	1.00E-02	352	9.88E-04	11.17	0.00E+00	0.00E+00	5	
LS1b (10)		838379	820483		341		1.52	85		342		344		1.46	82	1.00E-02	345	1.05E-03	11.02	0.00E+00	0.00E+00	5	
LS1b (11)		838394	820482		337		1.51	85		337		340		1.46	82	1.00E-02	340	1.10E-03	10.93	0.00E+00	0.00E+00	5	
LS1b (12)		838408	820479		335		1.51	85		336		338		1.46	82	1.00E-02	339	1.11E-03	10.89	0.00E+00	0.00E+00	5	
LS1b (13)		838422	820474		336		1.51	85		336		339		1.46	82	1.00E-02	339	1.11E-03	10.91	0.00E+00	0.00E+00	5	
LS1b (14)		838435	820466		340		1.51	85		340		343		1.46	82	1.00E-02	343	1.07E-03	10.99	0.00E+00	0.00E+00	5	
LS1b (15)		838446	820457		347		1.52	85		347		350		1.46	82	1.00E-02	350	1.01E-03	11.12	0.00E+00	0.00E+00	5	
LS1b (16)		838457	820446		355		1.52	85		356		358		1.47	82	1.00E-02	359	9.35E-04	11.29	0.00E+00	0.00E+00	5	
LS1b (17)		838466	820434		366		1.52	85		366		369		1.47	82	1.00E-02	369	8.59E-04	11.49	0.00E+00	0.00E+00	5	
LS1b (18)		838474	820422		377		1.52	85		378		380		1.47	82	1.00E-02	381	7.83E-04	11.71	0.00E+00	0.00E+00	5	
LS1b (19)		838481	820408		390		1.52	85		391		393		1.47	82	1.00E-02	394	7.08E-04	11.94	0.00E+00	0.00E+00	5	
LS1b (20)		838485	820394		404		1.52	85		405		407		1.48	83	1.00E-02	408	6.38E-04	12.19	0.00E+00	0.00E+00	5	
LS1b (21)		838486	820378		420		1.53	85		420		423		1.48	83	1.00E-02	423	5.72E-04	12.45	0.00E+00	0.00E+00	5	
LS1b (22)		838486	820363		435		1.53	85		435		438		1.48	83	1.00E-02	438	5.15E-04	12.70	0.00E+00	0.00E+00	5	
LS1b (23)		838486	820348		450		1.53	86		450		453		1.49	83	1.00E-02	453	4.65E-04	12.94	0.00E+00	0.00E+00	4	
LS1b (24)		838486	820333		465		1.53	86		465		468		1.49	83	1.00E-02	468	4.22E-04	13.17	0.00E+00	0.00E+00	4	
LS1b (25)		838485	820318		480		1.53	86		480		483		1.49	83	1.00E-02	483	3.84E-04	13.40	0.00E+00	0.00E+00	4	
LS1b (26)		838481	820303		495		1.53	86		495		498		1.49	84	1.00E-02	498	3.50E-04	13.62	0.00E+00	0.00E+00	4	
LS1b (27)		838475	820290		509		1.53	86		509		512		1.50	84	1.00E-02	512	3.23E-04	13.82	0.00E+00	0.00E+00	4	
LS1b (28)		838467	820276		523		1.53	86		523		526		1.50	84	1.00E-02	526	2.98E-04	14.01	0.00E+00	0.00E+00	4	
LS1b (29)		838458	820264		535		1.54	86		536		538		1.50	84	1.00E-02	539	2.77E-04	14.19	0.00E+00	0.00E+00	4	
sum											0.00E+00	sum											2.02E-02
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1c	Light Sources Type		LED																		
LS1c (1)	756000	838470	820427	17.5	372	3.5	1.56	87	5.00E-03	372	2.56E-04	372	4	1.55	87	1.00E-02	372	4.30E-04	22.56	5.78E-03	8.97E-03	3	
LS1c (2)	756000	838322	820465	17.5	384	3.5	1.56	87	5.00E-03	384	2.34E-04	384	4	1.55	87	1.00E-02	384	3.93E-04	22.70	5.32E-03	8.35E-03	3	

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h)-2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/2h)-2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$					
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree												
sum										4.90E-04 5.25E-04			0.00			sum	8.24E-04 2.11E-02										
Light Source LS2: Public Sports Ground																											
Light Sources drawing are referred to Page 4 in Appendix 11G		LS2b	Light Sources Type	SFC6	Approximate reflectance factor for grass								0.2														
sum										0.00E+00			sum	0.00E+00													
Light Source LS3: Indoor Sports Centre																											
Light Sources drawing are referred to Page 4 in Appendix 11G		LS3a	Light Sources Type	SFC10	Approximate reflectance factor for wall surface								0.6														
LS3a (1)	272000	838251	820826	43	22	263	1.49	83	No direct light	264	No direct light	266	22	1.41	79	1.00E-02	267	2.60E-03	8.42	0.00E+00	0.00E+00	7					
LS3a (2)		838263	820836											253	1.48	83	254	256	1.40	78	1.00E-02	257	2.92E-03	8.19	0.00E+00	0.00E+00	7
LS3a (3)		838276	820844											242	1.48	83	243	245	1.39	78	1.00E-02	246	3.35E-03	7.91	0.00E+00	0.00E+00	7
LS3a (4)		838291	820846											228	1.47	82	229	231	1.38	77	1.00E-02	232	3.98E-03	7.58	0.00E+00	0.00E+00	8
LS3a (5)		838306	820843											212	1.47	82	213	215	1.37	76	1.00E-02	216	4.88E-03	7.19	0.00E+00	0.00E+00	8
LS3a (6)		838320	820834											197	1.46	82	198	200	1.35	76	1.00E-02	201	6.06E-03	6.80	0.00E+00	0.00E+00	8
LS3a (7)		838328	820821											187	1.45	81	188	190	1.34	75	1.00E-02	191	7.07E-03	6.52	0.00E+00	0.00E+00	9
LS3a (8)		838334	820808											179	1.45	81	180	182	1.33	74	1.00E-02	183	7.99E-03	6.31	0.00E+00	0.00E+00	9
LS3a (9)		838340	820794											173	1.44	81	174	176	1.33	74	1.00E-02	177	8.82E-03	6.14	0.00E+00	0.00E+00	9
LS3a (10)		838345	820780											169	1.44	81	171	172	1.32	74	1.00E-02	174	9.40E-03	6.03	0.00E+00	0.00E+00	9
LS3a (11)		838350	820766											166	1.44	80	168	169	1.32	73	1.00E-02	171	9.88E-03	5.95	0.00E+00	0.00E+00	10
LS3a (12)		838354	820751											165	1.44	80	167	168	1.32	73	1.00E-02	170	1.00E-02	5.92	0.00E+00	0.00E+00	10
LS3a (13)		838359	820737											165	1.44	80	166	168	1.31	73	1.00E-02	169	1.01E-02	5.91	0.00E+00	0.00E+00	10
LS3a (14)		838365	820724											165	1.44	80	166	168	1.31	73	1.00E-02	169	1.01E-02	5.91	0.00E+00	0.00E+00	10
LS3a (15)		838370	820710											167	1.44	81	169	170	1.32	74	1.00E-02	172	9.67E-03	5.98	0.00E+00	0.00E+00	9
LS3a (16)		838376	820696											171	1.44	81	172	174	1.32	74	1.00E-02	175	9.15E-03	6.08	0.00E+00	0.00E+00	9
LS3a (17)		838380	820682											176	1.45	81	177	179	1.33	74	1.00E-02	180	8.43E-03	6.22	0.00E+00	0.00E+00	9
LS3a (18)		838381	820667											186	1.45	81	187	189	1.34	75	1.00E-02	190	7.19E-03	6.49	0.00E+00	0.00E+00	9
LS3a (19)		838378	820651											199	1.46	82	200	202	1.36	76	1.00E-02	203	5.89E-03	6.85	0.00E+00	0.00E+00	8
LS3a (20)		838370	820638											214	1.47	82	215	217	1.37	77	1.00E-02	218	4.77E-03	7.24	0.00E+00	0.00E+00	8
LS3a (21)		838359	820626											230	1.48	83	231	233	1.38	77	1.00E-02	234	3.87E-03	7.64	0.00E+00	0.00E+00	7
LS3a (22)		838346	820618											245	1.48	83	246	248	1.39	78	1.00E-02	249	3.24E-03	7.98	0.00E+00	0.00E+00	7
LS3a (23)		838331	820614											258	1.49	83	259	261	1.40	78	1.00E-02	262	2.77E-03	8.29	0.00E+00	0.00E+00	7
LS3a (24)		838316	820613											270	1.49	83	270	273	1.41	79	1.00E-02	273	2.44E-03	8.56	0.00E+00	0.00E+00	7
sum										0.00E+00			sum	1.55E-01													
Light Sources drawing are referred to Page 4 in Appendix 11G		LS3b	Light Sources Type	SFC02	Approximate reflectance factor for concrete ground								0.4														
LS3b (1)	6890	838287	820850	31	10	232	1.53	86	5.00E-03	232	1.93E-05	232	10	1.48	83	1.00E-02	232	7.68E-05	12.80	2.46E-04	1.23E-04	4					
LS3b (2)		838272	820851											247	1.53	86	5.00E-03	247	1.60E-05	247	1.49	83	1.00E-02	247	6.40E-05	13.23	2.12E-04
sum										3.53E-05			sum	1.41E-04													
Light Sources drawing are referred to Page 4 in Appendix 11G		LS3c	Light Sources Type	SFC03	Approximate reflectance factor for Concrete ground								0.4														
LS3c (5)	21600	838310	820873	15.8	212	5.2	1.55	87	5.00E-03	212	4.12E-05	212	5.2	1.52	85	1.00E-02	212	6.58E-05	16.81	6.92E-04	5.97E-04	3					
LS3c (6)	36000	838322	820838	15.8	191	5.2	1.54	86	5.00E-03	191	9.40E-05	191	5.2	1.52	85	1.00E-02	191	1.50E-04	16.07	1.51E-03	1.19E-03	4					
LS3c (7)	36000	838283	820875	15.8	238	5.2	1.55	87	5.00E-03	238	4.87E-05	238	5.2	1.53	85	1.00E-02	238	7.79E-05	17.59	8.58E-04	8.10E-04	3					
LS3c (8)	36000	838308	820869	15.8	213	5.2	1.55	87	5.00E-03	213	6.80E-05	213	5.2	1.52	85	1.00E-02	213	1.09E-04	16.83	1.14E-03	9.90E-04	3					

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (f \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eye $= E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_e / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$				
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree											
LS3c (9)	36000	838321	820844	15.8	192	5.2	1.54	86	5.00E-03	193	9.18E-05	192	5.2	1.52	85	1.00E-02	193	1.47E-04	16.13	1.48E-03	1.18E-03	4				
LS3c (10)	36000	838340	820794	15.8	168	5.2	1.54	86	5.00E-03	168	1.37E-04	168	5.2	1.51	84	1.00E-02	168	2.19E-04	15.18	2.08E-03	1.46E-03	4				
LS3c (11)	36000	838357	820748	15.8	158	5.2	1.54	86	5.00E-03	159	1.64E-04	158	5.2	1.51	84	1.00E-02	159	2.63E-04	14.75	2.42E-03	1.61E-03	4				
LS3c (14)	32400	838373	820703	26.8	164	5.8	1.54	86	5.00E-03	164	1.49E-04	164	5.8	1.50	84	1.00E-02	164	2.38E-04	14.20	2.12E-03	1.31E-03	4				
LS3c (16)	25200	838385	820669	43.8	176	22.8	1.44	81	5.00E-03	178	3.60E-04	176	22.8	1.32	73	1.00E-02	178	5.62E-04	6.05	2.18E-03	2.47E-04	9				
LS3c (17)	18000	838332	820810	43.8	177	22.8	1.44	81	5.00E-03	178	2.54E-04	177	22.8	1.32	74	1.00E-02	178	3.97E-04	6.07	1.54E-03	1.76E-04	9				
LS3c (18)	18000	838341	820786	43.8	168	22.8	1.44	80	5.00E-03	169	2.96E-04	168	22.8	1.31	73	1.00E-02	169	4.62E-04	5.82	1.73E-03	1.82E-04	10				
LS3c (19)	18000	838349	820762	43.8	163	22.8	1.43	80	5.00E-03	164	3.23E-04	163	22.8	1.30	72	1.00E-02	164	5.02E-04	5.69	1.84E-03	1.85E-04	10				
LS3c (20)	18000	838358	820738	43.8	161	22.8	1.43	80	5.00E-03	163	3.33E-04	161	22.8	1.30	72	1.00E-02	163	5.17E-04	5.64	1.88E-03	1.86E-04	10				
LS3c (21)	14400	838366	820715	43.8	163	22.8	1.43	80	5.00E-03	165	2.56E-04	163	22.8	1.30	72	1.00E-02	165	3.98E-04	5.70	1.46E-03	1.48E-04	10				
LS3c (22)	18000	838308	820860	43.8	210	22.8	1.46	82	5.00E-03	211	1.52E-04	210	22.8	1.36	76	1.00E-02	211	2.40E-04	6.94	1.06E-03	1.57E-04	8				
LS3c (23)	18000	838320	820839	43.8	193	22.8	1.45	81	5.00E-03	194	1.97E-04	193	22.8	1.34	75	1.00E-02	194	3.09E-04	6.49	1.28E-03	1.67E-04	9				
LS3c (24)	21600	838318	820833	43.8	194	22.8	1.45	81	5.00E-03	195	2.33E-04	194	22.8	1.34	75	1.00E-02	195	3.65E-04	6.52	1.52E-03	2.00E-04	9				
sum										3.20E-03	sum										5.02E-03					

Light Sources drawing are referred to Page 4 in Appendix 11G

LS3d Light Sources Type SFC07&8 Approximate reflectance factor for lawn 0.2

LS3d(1)	2252000	838307	820838	68	210	47	1.35	75	0.00E+00	215	0.00E+00	210	47	1.15	64	1.00E-02	215	2.79E-02	3.83	0.00E+00	0.00E+00	15
LS3d(2)	2252000	838321	820825	68	194	47	1.33	74	0.00E+00	200	0.00E+00	194	47	1.12	62	1.00E-02	200	3.44E-02	3.58	0.00E+00	0.00E+00	16
LS3d(3)	2252000	838328	820805	68	185	47	1.32	74	0.00E+00	191	0.00E+00	185	47	1.10	61	1.00E-02	191	3.93E-02	3.43	0.00E+00	0.00E+00	16
LS3d(4)	2252000	838336	820785	68	178	47	1.31	73	0.00E+00	184	0.00E+00	178	47	1.08	60	1.00E-02	184	4.35E-02	3.31	0.00E+00	0.00E+00	17
LS3d(5)	2252000	838343	820766	68	173	47	1.31	73	0.00E+00	179	0.00E+00	173	47	1.07	59	1.00E-02	179	4.69E-02	3.23	0.00E+00	0.00E+00	17
LS3d(6)	2252000	838351	820746	68	170	47	1.30	73	0.00E+00	177	0.00E+00	170	47	1.07	59	1.00E-02	177	4.89E-02	3.18	0.00E+00	0.00E+00	17
LS3d(7)	2252000	838358	820726	68	171	47	1.30	73	0.00E+00	177	0.00E+00	171	47	1.07	59	1.00E-02	177	4.83E-02	3.20	0.00E+00	0.00E+00	17
LS3d(8)	2252000	838365	820706	68	174	47	1.31	73	0.00E+00	180	0.00E+00	174	47	1.07	60	1.00E-02	180	4.64E-02	3.24	0.00E+00	0.00E+00	17
LS3d(9)	2252000	838372	820690	68	178	47	1.31	73	0.00E+00	184	0.00E+00	178	47	1.08	60	1.00E-02	184	4.37E-02	3.31	0.00E+00	0.00E+00	17
LS3d(10)	2252000	838373	820683	68	180	47	1.32	73	0.00E+00	186	0.00E+00	180	47	1.09	60	1.00E-02	186	4.20E-02	3.35	0.00E+00	0.00E+00	17
LS3d(11)	2252000	838375	820674	68	185	47	1.32	74	0.00E+00	191	0.00E+00	185	47	1.10	61	1.00E-02	191	3.93E-02	3.43	0.00E+00	0.00E+00	16
LS3d(12)	2252000	838374	820666	68	191	47	1.33	74	0.00E+00	197	0.00E+00	191	47	1.11	62	1.00E-02	197	3.59E-02	3.53	0.00E+00	0.00E+00	16
LS3d(13)	2252000	838373	820657	68	198	47	1.34	75	0.00E+00	204	0.00E+00	198	47	1.13	63	1.00E-02	204	3.25E-02	3.65	0.00E+00	0.00E+00	15
LS3d(14)	2252000	838370	820649	68	206	47	1.35	75	0.00E+00	212	0.00E+00	206	47	1.14	64	1.00E-02	212	2.92E-02	3.78	0.00E+00	0.00E+00	15
LS3d(15)	2252000	838365	820641	68	215	47	1.36	76	0.00E+00	220	0.00E+00	215	47	1.16	64	1.00E-02	220	2.62E-02	3.91	0.00E+00	0.00E+00	14
LS3d(16)	2252000	838360	820635	68	223	47	1.36	76	0.00E+00	228	0.00E+00	223	47	1.17	65	1.00E-02	228	2.34E-02	4.05	0.00E+00	0.00E+00	14
LS3d(17)	2252000	838353	820629	68	232	47	1.37	77	0.00E+00	237	0.00E+00	232	47	1.19	66	1.00E-02	237	2.11E-02	4.18	0.00E+00	0.00E+00	13
LS3d(18)	2252000	838345	820625	68	240	47	1.38	77	0.00E+00	245	0.00E+00	240	47	1.20	67	1.00E-02	245	1.91E-02	4.31	0.00E+00	0.00E+00	13
LS3d(19)	2252000	838337	820622	68	248	47	1.38	77	0.00E+00	252	0.00E+00	248	47	1.21	67	1.00E-02	252	1.76E-02	4.42	0.00E+00	0.00E+00	13
LS3d(20)	2252000	838328	820620	68	256	47	1.39	78	0.00E+00	260	0.00E+00	256	47	1.22	68	1.00E-02	260	1.61E-02	4.54	0.00E+00	0.00E+00	12
LS3d(21)	2252000	838320	820620	68	262	47	1.39	78	0.00E+00	267	0.00E+00	262	47	1.23	68	1.00E-02	267	1.50E-02	4.64	0.00E+00	0.00E+00	12
LS3d(22)	2252000	838311	820620	68	269	47	1.40	78	0.00E+00	273	0.00E+00	269	47	1.23	69	1.00E-02	273	1.40E-02	4.74	0.00E+00	0.00E+00	12
LS3d(23)	2252000	838302	820622	68	274	47	1.40	78	0.00E+00	278	0.00E+00	274	47	1.24	69	1.00E-02	278	1.32E-02	4.82	0.00E+00	0.00E+00	12
LS3d(24)	2252000	838294	820624	68	279	47	1.40	78	0.00E+00	283	0.00E+00	279	47	1.25	69	1.00E-02	283	1.25E-02	4.89	0.00E+00	0.00E+00	12
LS3d(25)	2252000	838286	820627	68	284	47	1.41	79	0.00E+00	288	0.00E+00	284	47	1.25	70	1.00E-02	288	1.20E-02	4.96	0.00E+00	0.00E+00	11
LS3d(26)	2252000	838278	820632	68	287	47	1.41	79	0.00E+00	291	0.00E+00	287	47	1.25	70	1.00E-02	291	1.16E-02	5.01	0.00E+00	0.00E+00	11
LS3d(27)	2252000	838268	820630	68	296	47	1.41	79	0.00E+00	300	0.00E+00	296	47	1.26	70	1.00E-02	300	1.06E-02	5.14	0.00E+00	0.00E+00	11

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/2h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (f \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eye $= E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$					
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree												
LS3d(28)	2252000	838259	820639	68	299	47	1.42	79	0.00E+00	303	0.00E+00	299	47	1.27	71	1.00E-02	303	1.03E-02	5.18	0.00E+00	0.00E+00	11					
LS3d(29)	2252000	838242	820659	68	304	47	1.42	79	5.00E-03	307	1.28E-02	304	47	1.27	71	1.00E-02	307	9.87E-03	5.24	6.69E-02	5.74E-03	11					
LS3d(30)	2252000	838230	820682	68	306	47	1.42	79	5.00E-03	310	1.25E-02	306	47	1.27	71	1.00E-02	310	9.66E-03	5.28	6.59E-02	5.72E-03	11					
LS3d(31)	2252000	838221	820706	68	306	47	1.42	79	5.00E-03	310	1.25E-02	306	47	1.27	71	1.00E-02	310	9.63E-03	5.28	6.57E-02	5.72E-03	11					
LS3d(32)	2252000	838216	820731	68	304	47	1.42	79	5.00E-03	308	1.27E-02	304	47	1.27	71	1.00E-02	308	9.85E-03	5.25	6.68E-02	5.74E-03	11					
LS3d(33)	2252000	838220	820756	68	296	47	1.41	79	5.00E-03	300	1.37E-02	296	47	1.26	70	1.00E-02	300	1.06E-02	5.14	7.05E-02	5.81E-03	11					
LS3d(34)	2252000	838227	820781	68	286	47	1.41	79	5.00E-03	290	1.52E-02	286	47	1.25	70	1.00E-02	290	1.17E-02	4.99	7.59E-02	5.91E-03	11					
LS3d(35)	2252000	838238	820803	68	275	47	1.40	78	5.00E-03	279	1.70E-02	275	47	1.24	69	1.00E-02	279	1.31E-02	4.83	8.22E-02	6.02E-03	12					
sum										9.64E-02											sum	8.55E-01					
sum										9.96E-02											sum	1.01E+00					
Light source LS4: Office Block																											
Light Sources drawing are referred to Page 4 in Appendix 11G		LS4a	Light Sources Type	SFC04	Approximate reflectance factor for wall surface										0.6												
sum										0.00E+00											sum	0.00E+00					
Light Sources drawing are referred to Page 4 in Appendix 11G		LS4b	Light Sources Type	SFC03	Approximate reflectance factor for grass										0.2												
LS4b (2)	75600	838203	820408	17.8	498	3.2	1.56	88	5.00E-03	498	6.86E-06	498	3	1.56	87	1.00E-02	498	5.49E-06	24.18	1.66E-04	2.96E-04	2					
sum										6.86E-06											sum	5.49E-06					
Light Sources drawing are referred to Page 4 in Appendix 11G		LS4c	Light Sour	SFC09	Approximate reflectance factor for dark stone										0.3												
LS4c (1)	426000	838204	820363	49.5	533	28.5	1.52	85	5.00E-03	534	2.80E-04	533	29	1.46	82	1.00E-02	534	No reflection	11.29	3.16E-03	1.23E-03	5					
LS4c (2)	426000	838204	820348	49.5	545	28.5	1.52	85	5.00E-03	545	2.62E-04	545	29	1.47	82	1.00E-02	545	No reflection	11.44	3.00E-03	1.20E-03	5					
LS4c (3)	426000	838204	820334	49.5	557	28.5	1.52	85	5.00E-03	557	2.45E-04	557	29	1.47	82	1.00E-02	557	No reflection	11.59	2.84E-03	1.17E-03	5					
LS4c (4)	284000	838204	820319	49.5	569	28.5	1.52	85	5.00E-03	570	1.53E-04	569	29	1.47	82	1.00E-02	570	No reflection	11.74	1.80E-03	7.60E-04	5					
sum										9.40E-04											sum	0.00E+00					
sum										9.47E-04											sum	5.49E-06					
Light source LS6: Podium Deck																											
Light Sources drawing are referred to Page 4 in Appendix 11G		LS6a	Light Sources Type	SFC02	Approximate reflectance factor for Concrete ground										0.4												
LS6a (1)		838568	820568		236		1.56	87	5.00E-03	236	5.53E-06	236	3	1.55	87	1.00E-02	236	8.84E-06	20.98	1.16E-04	1.56E-04	3					
LS6a (2)		838555	820564		236		1.56	87	5.00E-03	236	5.48E-06	236	3	1.55	87	1.00E-02	236	8.77E-06	20.99	1.15E-04	1.55E-04	3					
LS6a (3)		838541	820561		238		1.56	87	5.00E-03	238	5.39E-06	238	3	1.55	87	1.00E-02	238	8.62E-06	21.02	1.13E-04	1.53E-04	3					
LS6a (4)		838528	820558		240		1.56	87	5.00E-03	240	5.24E-06	240	3	1.55	87	1.00E-02	240	8.38E-06	21.08	1.10E-04	1.50E-04	3					
LS6a (5)		838514	820554		243		1.56	87	5.00E-03	243	5.05E-06	243	3	1.55	87	1.00E-02	243	8.07E-06	21.15	1.07E-04	1.46E-04	3					
LS6a (6)		838501	820551		247		1.56	87	5.00E-03	247	4.82E-06	247	3	1.55	87	1.00E-02	247	7.71E-06	21.23	1.02E-04	1.41E-04	3					
LS6a (7)		838488	820547		251		1.56	87	5.00E-03	251	4.57E-06	251	3	1.55	87	1.00E-02	251	7.31E-06	21.33	9.75E-05	1.35E-04	3					
LS6a (8)		838474	820544		256		1.56	87	5.00E-03	256	4.30E-06	256	3	1.55	87	1.00E-02	256	6.89E-06	21.44	9.23E-05	1.29E-04	3					
LS6a (9)		838464	820549		253		1.56	87	5.00E-03	253	4.46E-06	253	3	1.55	87	1.00E-02	253	7.13E-06	21.37	9.53E-05	1.33E-04	3					
LS6a (10)		838558	820550		251		1.56	87	5.00E-03	251	4.58E-06	251	3	1.55	87	1.00E-02	251	7.32E-06	21.32	9.76E-05	1.35E-04	3					
LS6a (11)		838562	820536		266		1.56	87	5.00E-03	266	3.85E-06	266	3	1.55	87	1.00E-02	266	6.17E-06	21.63	8.34E-05	1.19E-04	3					
LS6a (12)		838566	820522		280		1.56	87	5.00E-03	280	3.28E-06	280	3	1.55	87	1.00E-02	280	5.25E-06	21.91	7.19E-05	1.05E-04	3					
LS6a (13)		838569	820507		295		1.56	87	5.00E-03	295	2.81E-06	295	3	1.55	87	1.00E-02	295	4.50E-06	22.17	6.24E-05	9.35E-05	3					
LS6a (14)		838573	820493		310		1.56	87	5.00E-03	310	2.43E-06	310	3	1.55	87	1.00E-02	310	3.89E-06	22.41	5.45E-05	8.35E-05	3					
LS6a (15)		838576	820479		325		1.56	87	5.00E-03	325	2.11E-06	325	3	1.55	87	1.00E-02	325	3.38E-06	22.64	4.79E-05	7.48E-05	3					
LS6a (16)		838581	820465		339		1.56	87	5.00E-03	339	1.85E-06	339	3	1.55	87	1.00E-02	339	2.96E-06	22.84	4.23E-05	6.74E-05	3					

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eye $= E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum \Sigma 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$			
							d/h	Φ Degree						d/2/h	Φ Degree										
		X (m)	Y (m)	Z (mPD)																					
LS6a (17)	6890	838584	820450	18	354	3	1.56	88	5.00E-03	354	1.63E-06	354	3	1.55	87	1.00E-02	354	2.61E-06	23.04	3.76E-05	6.08E-05	2			
LS6a (18)		838588	820436		369		1.56	88	5.00E-03	369	1.44E-06	369	3	1.55	87	1.00E-02	369	2.31E-06	23.22	3.35E-05	5.51E-05	2			
LS6a (19)		838591	820421		384		1.56	88	5.00E-03	384	1.28E-06	384	3	1.56	87	1.00E-02	384	2.05E-06	23.39	2.99E-05	4.99E-05	2			
LS6a (20)		838577	820417		385		1.56	88	5.00E-03	385	1.27E-06	385	3	1.56	87	1.00E-02	385	2.02E-06	23.41	2.96E-05	4.95E-05	2			
LS6a (21)		838562	820414		387		1.56	88	5.00E-03	387	1.25E-06	387	3	1.56	87	1.00E-02	387	2.00E-06	23.42	2.93E-05	4.91E-05	2			
LS6a (22)		838547	820410		389		1.56	88	5.00E-03	389	1.23E-06	389	3	1.56	87	1.00E-02	389	1.97E-06	23.45	2.89E-05	4.84E-05	2			
LS6a (23)		838535	820436		362		1.56	88	5.00E-03	362	1.53E-06	362	3	1.55	87	1.00E-02	362	2.45E-06	23.13	3.54E-05	5.78E-05	2			
LS6a (24)		838531	820450		347		1.56	88	5.00E-03	347	1.73E-06	347	3	1.55	87	1.00E-02	347	2.77E-06	22.95	3.97E-05	6.37E-05	2			
LS6a (25)		838527	820465		333		1.56	87	5.00E-03	333	1.96E-06	333	3	1.55	87	1.00E-02	333	3.14E-06	22.75	4.47E-05	7.06E-05	3			
LS6a (26)		838516	820485		312		1.56	87	5.00E-03	312	2.38E-06	312	3	1.55	87	1.00E-02	312	3.81E-06	22.45	5.35E-05	8.22E-05	3			
LS6a (27)		838512	820501		296		1.56	87	5.00E-03	296	2.78E-06	296	3	1.55	87	1.00E-02	296	4.45E-06	22.19	6.17E-05	9.27E-05	3			
LS6a (28)		838486	820477		321		1.56	87	5.00E-03	321	2.19E-06	321	3	1.55	87	1.00E-02	321	3.50E-06	22.58	4.94E-05	7.66E-05	3			
LS6a (29)		838485	820494		305		1.56	87	5.00E-03	305	2.56E-06	305	3	1.55	87	1.00E-02	305	4.10E-06	22.33	5.72E-05	8.70E-05	3			
LS6a (30)		838481	820467		332		1.56	87	5.00E-03	332	1.98E-06	332	3	1.55	87	1.00E-02	332	3.16E-06	22.74	4.49E-05	7.09E-05	3			
LS6a (31)		838230	820297		575		1.57	88	5.00E-03	575	3.81E-07	575	3	1.56	87	1.00E-02	575	6.09E-07	24.91	9.49E-06	1.80E-05	2			
LS6a (50)		838404	820176		631		1.57	88	5.00E-03	631	2.88E-07	631	3	1.56	87	1.00E-02	631	4.62E-07	25.20	7.27E-06	1.41E-05	2			
LS6a (51)		838436	820567		242		1.56	87	5.00E-03	242	5.07E-06	242	3	1.55	87	1.00E-02	242	8.11E-06	21.14	1.07E-04	1.46E-04	3			
LS6a (52)		838459	820563		240		1.56	87	5.00E-03	240	5.21E-06	240	3	1.55	87	1.00E-02	240	8.34E-06	21.09	1.10E-04	1.49E-04	3			
LS6a (53)		838430	820560		251		1.56	87	5.00E-03	251	4.55E-06	251	3	1.55	87	1.00E-02	251	7.28E-06	21.33	9.71E-05	1.35E-04	3			
LS6a (54)		838445	820559		248		1.56	87	5.00E-03	248	4.74E-06	248	3	1.55	87	1.00E-02	248	7.59E-06	21.26	1.01E-04	1.39E-04	3			
LS6a (55)		838452	820547		257		1.56	87	5.00E-03	257	4.24E-06	257	3	1.55	87	1.00E-02	257	6.78E-06	21.46	9.10E-05	1.28E-04	3			
sum											sum														
LS6b(56)		6890	838534		820543		18	255	3	1.56	87	5.00E-03	255	4.36E-06	255	3	1.55	87	1.00E-02	255	6.98E-06	21.41	9.34E-05	1.31E-04	3
LS6b(57)			838538		820526			272		1.56	87	5.00E-03	272	3.60E-06	272	3	1.55	87	1.00E-02	272	5.76E-06	21.75	7.84E-05	1.13E-04	3
LS6b(58)			838542		820510			289		1.56	87	5.00E-03	289	3.01E-06	289	3	1.55	87	1.00E-02	289	4.81E-06	22.06	6.64E-05	9.85E-05	3
LS6b(59)	838546		820493	305	1.56	87		5.00E-03		305	2.54E-06	305	3	1.55	87	1.00E-02	305	4.06E-06	22.34	5.67E-05	8.64E-05	3			
LS6b(60)	838551		820474	325	1.56	87		5.00E-03		325	2.10E-06	325	3	1.55	87	1.00E-02	325	3.36E-06	22.64	4.76E-05	7.45E-05	3			
LS6b(61)	838555		820458	342	1.56	87		5.00E-03		342	1.81E-06	342	3	1.55	87	1.00E-02	342	2.89E-06	22.88	4.14E-05	6.60E-05	3			
LS6b(62)	838560		820441	359	1.56	88		5.00E-03		359	1.56E-06	359	3	1.55	87	1.00E-02	359	2.50E-06	23.10	3.61E-05	5.88E-05	2			
LS6b(63)	838564		820425	376	1.56	88		5.00E-03		376	1.36E-06	376	3	1.55	87	1.00E-02	376	2.18E-06	23.30	3.18E-05	5.26E-05	2			
LS6b(64)	838567		820387	414	1.56	88		5.00E-03		414	1.02E-06	414	3	1.56	87	1.00E-02	414	1.64E-06	23.71	2.42E-05	4.15E-05	2			
LS6b(65)	838575		820375	427	1.56	88		5.00E-03		427	9.31E-07	427	3	1.56	87	1.00E-02	427	1.49E-06	23.83	2.22E-05	3.84E-05	2			
LS6b(66)	838548		820382	417	1.56	88		5.00E-03		417	1.00E-06	417	3	1.56	87	1.00E-02	417	1.60E-06	23.74	2.37E-05	4.08E-05	2			
LS6b(67)	838531		820377	420	1.56	88		5.00E-03		420	9.75E-07	420	3	1.56	87	1.00E-02	420	1.56E-06	23.77	2.32E-05	3.99E-05	2			
LS6b(68)	838560		820372	428	1.56	88		5.00E-03		428	9.23E-07	428	3	1.56	87	1.00E-02	428	1.48E-06	23.84	2.20E-05	3.82E-05	2			
LS6b(69)	838541		820367	431	1.56	88		5.00E-03		431	9.07E-07	431	3	1.56	87	1.00E-02	431	1.45E-06	23.87	2.16E-05	3.76E-05	2			
LS6b(70)	838525		820365	432	1.56	88		5.00E-03		432	8.96E-07	432	3	1.56	87	1.00E-02	432	1.43E-06	23.88	2.14E-05	3.72E-05	2			
LS6b(71)	838513		820358	439	1.56	88		5.00E-03		439	8.56E-07	439	3	1.56	87	1.00E-02	439	1.37E-06	23.94	2.05E-05	3.58E-05	2			
LS6b(72)	838502		820344	454	1.56	88		5.00E-03		454	7.75E-07	454	3	1.56	87	1.00E-02	454	1.24E-06	24.07	1.86E-05	3.30E-05	2			
LS6b(73)	838502		820361	436	1.56	88		5.00E-03		436	8.71E-07	436	3	1.56	87	1.00E-02	436	1.39E-06	23.92	2.08E-05	3.63E-05	2			
LS6b(74)	838501		820376	421	1.56	88		5.00E-03		421	9.69E-07	421	3	1.56	87	1.00E-02	421	1.55E-06	23.78	2.30E-05	3.97E-05	2			
LS6b(75)	838498		820393	404	1.56	88		5.00E-03		404	1.10E-06	404	3	1.56	87	1.00E-02	404	1.75E-06	23.61	2.59E-05	4.40E-05	2			
LS6b(76)	838493		820410	387	1.56	88		5.00E-03		387	1.24E-06	387	3	1.56	87	1.00E-02	387	1.99E-06	23.43	2.92E-05	4.88E-05	2			

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/2h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eye $= E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_e) / \theta^2$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree							
LS6b(77)		838487	820426		372	1.56	88	5.00E-03	372	1.41E-06	372	3	1.55	87	1.00E-02	372	2.25E-06	23.26	3.27E-05	5.40E-05	2	
LS6b(78)		838478	820442		357	1.56	88	5.00E-03	357	1.59E-06	357	3	1.55	87	1.00E-02	357	2.54E-06	23.08	3.66E-05	5.95E-05	2	
LS6b(79)		838469	820456		344	1.56	88	5.00E-03	344	1.78E-06	344	3	1.55	87	1.00E-02	344	2.84E-06	22.91	4.07E-05	6.51E-05	2	
LS6b(80)		838471	820475		325	1.56	87	5.00E-03	325	2.10E-06	325	3	1.55	87	1.00E-02	325	3.36E-06	22.65	4.76E-05	7.45E-05	3	
LS6b(81)		838456	820472		330	1.56	87	5.00E-03	330	2.02E-06	330	3	1.55	87	1.00E-02	330	3.23E-06	22.71	4.59E-05	7.22E-05	3	
LS6b(82)		838448	820487		317	1.56	87	5.00E-03	317	2.28E-06	317	3	1.55	87	1.00E-02	317	3.64E-06	22.52	5.13E-05	7.93E-05	3	
LS6b(83)		838445	820504		301	1.56	87	5.00E-03	301	2.65E-06	301	3	1.55	87	1.00E-02	301	4.24E-06	22.27	5.91E-05	8.94E-05	3	
LS6b(84)		838446	820521		284	1.56	87	5.00E-03	284	3.17E-06	284	3	1.55	87	1.00E-02	284	5.07E-06	21.97	6.97E-05	1.03E-04	3	
LS6b(85)		838458	820538		265	1.56	87	5.00E-03	265	3.89E-06	265	3	1.55	87	1.00E-02	265	6.23E-06	21.61	8.41E-05	1.20E-04	3	
LS6b(86)		838480	820276		522	1.57	88	5.00E-03	522	5.08E-07	522	3	1.56	87	1.00E-02	522	8.13E-07	24.59	1.25E-05	2.30E-05	2	
LS6b(87)		838471	820264		534	1.57	88	5.00E-03	534	4.74E-07	534	3	1.56	87	1.00E-02	534	7.58E-07	24.67	1.17E-05	2.17E-05	2	
LS6b(104)		838256	820344		521	1.57	88	5.00E-03	521	5.12E-07	521	3	1.56	87	1.00E-02	521	8.20E-07	24.58	1.26E-05	2.32E-05	2	
LS6b(105)		838242	820355		519	1.57	88	5.00E-03	519	5.18E-07	519	3	1.56	87	1.00E-02	519	8.29E-07	24.56	1.27E-05	2.34E-05	2	
LS6b(106)		838228	820362		520	1.57	88	5.00E-03	520	5.15E-07	520	3	1.56	87	1.00E-02	520	8.24E-07	24.57	1.27E-05	2.33E-05	2	
LS6b(107)		838223	820313		564	1.57	88	5.00E-03	564	4.04E-07	564	3	1.56	87	1.00E-02	564	6.46E-07	24.85	1.00E-05	1.89E-05	2	
LS6b(108)		838235	820308		563	1.57	88	5.00E-03	563	4.06E-07	563	3	1.56	87	1.00E-02	563	6.49E-07	24.84	1.01E-05	1.90E-05	2	
LS6b(109)	6890	838231	820340	18	537	1.57	88	5.00E-03	537	4.66E-07	537	3	1.56	87	1.00E-02	537	7.46E-07	24.68	1.15E-05	2.14E-05	2	
LS6b(110)		838260	820370		496	1.56	88	5.00E-03	496	5.92E-07	496	3	1.56	87	1.00E-02	496	9.47E-07	24.41	1.44E-05	2.62E-05	2	
LS6b(111)		838246	820373		502	1.56	88	5.00E-03	502	5.74E-07	502	3	1.56	87	1.00E-02	502	9.18E-07	24.44	1.40E-05	2.55E-05	2	
LS6b(112)		838230	820379		505	1.56	88	5.00E-03	505	5.63E-07	505	3	1.56	87	1.00E-02	505	9.00E-07	24.47	1.38E-05	2.51E-05	2	
LS6b(113)		838260	820391		479	1.56	88	5.00E-03	479	6.59E-07	479	3	1.56	87	1.00E-02	479	1.05E-06	24.28	1.60E-05	2.87E-05	2	
LS6b(114)		838244	820390		487	1.56	88	5.00E-03	487	6.25E-07	487	3	1.56	87	1.00E-02	487	1.00E-06	24.34	1.52E-05	2.75E-05	2	
LS6b(115)		838226	820398		492	1.56	88	5.00E-03	492	6.09E-07	492	3	1.56	87	1.00E-02	492	9.74E-07	24.37	1.48E-05	2.69E-05	2	
LS6b(116)		838238	820409		476	1.56	88	5.00E-03	476	6.73E-07	476	3	1.56	87	1.00E-02	476	1.08E-06	24.25	1.63E-05	2.93E-05	2	
LS6b(117)		838253	820409		467	1.56	88	5.00E-03	467	7.09E-07	467	3	1.56	87	1.00E-02	467	1.13E-06	24.18	1.71E-05	3.06E-05	2	
LS6b(118)		838267	820410		459	1.56	88	5.00E-03	459	7.49E-07	459	3	1.56	87	1.00E-02	459	1.20E-06	24.12	1.81E-05	3.20E-05	2	
LS6b(119)		838270	820426		444	1.56	88	5.00E-03	444	8.25E-07	444	3	1.56	87	1.00E-02	444	1.32E-06	23.99	1.98E-05	3.48E-05	2	
LS6b(120)		838241	820423		462	1.56	88	5.00E-03	462	7.32E-07	462	3	1.56	87	1.00E-02	462	1.17E-06	24.14	1.77E-05	3.14E-05	2	
LS6b(121)		838254	820432		448	1.56	88	5.00E-03	448	8.07E-07	448	3	1.56	87	1.00E-02	448	1.29E-06	24.02	1.94E-05	3.41E-05	2	
LS6b(122)		838282	820444		422	1.56	88	5.00E-03	422	9.62E-07	422	3	1.56	87	1.00E-02	422	1.54E-06	23.79	2.29E-05	3.95E-05	2	
LS6b(123)		838266	820447		428	1.56	88	5.00E-03	428	9.23E-07	428	3	1.56	87	1.00E-02	428	1.48E-06	23.84	2.20E-05	3.82E-05	2	
LS6b(124)		838253	820451		433	1.56	88	5.00E-03	433	8.91E-07	433	3	1.56	87	1.00E-02	433	1.43E-06	23.89	2.13E-05	3.71E-05	2	
LS6b(125)		838295	820460		401	1.56	88	5.00E-03	401	1.12E-06	401	3	1.56	87	1.00E-02	401	1.79E-06	23.58	2.64E-05	4.48E-05	2	
LS6b(126)		838273	820465		410	1.56	88	5.00E-03	410	1.05E-06	410	3	1.56	87	1.00E-02	410	1.68E-06	23.67	2.49E-05	4.25E-05	2	
LS6b(127)		838258	820471		414	1.56	88	5.00E-03	414	1.02E-06	414	3	1.56	87	1.00E-02	414	1.63E-06	23.71	2.42E-05	4.15E-05	2	
LS6b(128)		838288	820472		396	1.56	88	5.00E-03	396	1.17E-06	396	3	1.56	87	1.00E-02	396	1.87E-06	23.52	2.75E-05	4.64E-05	2	
LS6b(129)		838304	820478		381	1.56	88	5.00E-03	381	1.30E-06	381	3	1.56	87	1.00E-02	381	2.09E-06	23.37	3.05E-05	5.07E-05	2	
LS6b(130)		838318	820486		367	1.56	88	5.00E-03	367	1.46E-06	367	3	1.55	87	1.00E-02	367	2.34E-06	23.20	3.39E-05	5.56E-05	2	
LS6b(131)		838338	820495		349	1.56	88	5.00E-03	349	1.71E-06	349	3	1.55	87	1.00E-02	349	2.73E-06	22.97	3.92E-05	6.31E-05	2	
LS6b(132)		838353	820504		334	1.56	87	5.00E-03	334	1.95E-06	334	3	1.55	87	1.00E-02	334	3.11E-06	22.77	4.43E-05	7.01E-05	3	
LS6b(133)		838377	820501		326	1.56	87	5.00E-03	326	2.09E-06	326	3	1.55	87	1.00E-02	326	3.34E-06	22.65	4.74E-05	7.41E-05	3	
LS6b(134)		838404	820495		321	1.56	87	5.00E-03	321	2.19E-06	321	3	1.55	87	1.00E-02	321	3.51E-06	22.58	4.95E-05	7.70E-05	3	
LS6b(135)		838419	820491		320	1.56	87	5.00E-03	320	2.20E-06	320	3	1.55	87	1.00E-02	320	3.53E-06	22.57	4.98E-05	7.73E-05	3	

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/2h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (f \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum I_0 (E_e) / \theta^2$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree							
LS6b(136)		838436	820484		322	1.56	87	5.00E-03	322	2.16E-06	322	3	1.55	87	1.00E-02	322	3.46E-06	22.60	4.88E-05	7.61E-05	3	
LS6b(137)		838433	820501		306	1.56	87	5.00E-03	306	2.51E-06	306	3	1.55	87	1.00E-02	306	4.02E-06	22.36	5.62E-05	8.57E-05	3	
LS6b(138)		838416	820507		306	1.56	87	5.00E-03	306	2.53E-06	306	3	1.55	87	1.00E-02	306	4.05E-06	22.35	5.66E-05	8.62E-05	3	
LS6b(139)		838396	820512		309	1.56	87	5.00E-03	309	2.46E-06	309	3	1.55	87	1.00E-02	309	3.94E-06	22.39	5.51E-05	8.43E-05	3	
LS6b(140)		838371	820515		315	1.56	87	5.00E-03	315	2.31E-06	315	3	1.55	87	1.00E-02	315	3.69E-06	22.50	5.19E-05	8.01E-05	3	
LS6b(141)		838350	820524		318	1.56	87	5.00E-03	318	2.25E-06	318	3	1.55	87	1.00E-02	318	3.60E-06	22.54	5.07E-05	7.86E-05	3	
LS6b(142)		838326	820510		343	1.56	87	5.00E-03	343	1.79E-06	343	3	1.55	87	1.00E-02	343	2.87E-06	22.89	4.10E-05	6.56E-05	3	
LS6b(143)		838310	820503		357	1.56	88	5.00E-03	357	1.59E-06	357	3	1.55	87	1.00E-02	357	2.55E-06	23.07	3.67E-05	5.96E-05	2	
LS6b(144)		838297	820495		371	1.56	88	5.00E-03	371	1.41E-06	371	3	1.55	87	1.00E-02	371	2.26E-06	23.25	3.29E-05	5.42E-05	2	
LS6b(145)		838284	820490		383	1.56	88	5.00E-03	383	1.29E-06	383	3	1.56	87	1.00E-02	383	2.06E-06	23.38	3.01E-05	5.02E-05	2	
LS6b(146)		838268	820486		396	1.56	88	5.00E-03	396	1.17E-06	396	3	1.56	87	1.00E-02	396	1.87E-06	23.52	2.74E-05	4.63E-05	2	
LS6b(147)		838260	820506		386	1.56	88	5.00E-03	386	1.26E-06	386	3	1.56	87	1.00E-02	386	2.02E-06	23.41	2.95E-05	4.94E-05	2	
LS6b(148)		838275	820507		375	1.56	88	5.00E-03	375	1.37E-06	375	3	1.55	87	1.00E-02	375	2.19E-06	23.29	3.19E-05	5.29E-05	2	
LS6b(149)		838289	820510		364	1.56	88	5.00E-03	364	1.50E-06	364	3	1.55	87	1.00E-02	364	2.41E-06	23.16	3.48E-05	5.70E-05	2	
LS6b(150)		838302	820519		349	1.56	88	5.00E-03	349	1.70E-06	349	3	1.55	87	1.00E-02	349	2.71E-06	22.98	3.90E-05	6.27E-05	2	
LS6b(151)		838314	820527		335	1.56	87	5.00E-03	335	1.92E-06	335	3	1.55	87	1.00E-02	335	3.07E-06	22.79	4.37E-05	6.92E-05	3	
LS6b(152)		838334	820529		323	1.56	87	5.00E-03	323	2.15E-06	323	3	1.55	87	1.00E-02	323	3.44E-06	22.61	4.87E-05	7.59E-05	3	
LS6b(153)		838368	820533		301	1.56	87	5.00E-03	301	2.64E-06	301	3	1.55	87	1.00E-02	301	4.22E-06	22.28	5.88E-05	8.90E-05	3	
LS6b(154)		838385	820544		283	1.56	87	5.00E-03	283	3.18E-06	283	3	1.55	87	1.00E-02	283	5.09E-06	21.97	6.99E-05	1.03E-04	3	
LS6b(155)		838388	820527		298	1.56	87	5.00E-03	298	2.75E-06	298	3	1.55	87	1.00E-02	298	4.39E-06	22.21	6.10E-05	9.18E-05	3	
LS6b(156)		838401	820542		278	1.56	87	5.00E-03	278	3.35E-06	278	3	1.55	87	1.00E-02	278	5.36E-06	21.88	7.33E-05	1.07E-04	3	
LS6b(157)		838408	820524		292	1.56	87	5.00E-03	292	2.90E-06	292	3	1.55	87	1.00E-02	292	4.64E-06	22.12	6.41E-05	9.58E-05	3	
LS6b(158)		838416	820537		277	1.56	87	5.00E-03	277	3.39E-06	277	3	1.55	87	1.00E-02	277	5.42E-06	21.86	7.41E-05	1.08E-04	3	
LS6b(159)		838424	820525		286	1.56	87	5.00E-03	286	3.08E-06	286	3	1.55	87	1.00E-02	286	4.93E-06	22.02	6.78E-05	1.00E-04	3	
LS6b(160)		838433	820537		272	1.56	87	5.00E-03	272	3.58E-06	272	3	1.55	87	1.00E-02	272	5.73E-06	21.76	7.79E-05	1.13E-04	3	
LS6b(161)		838437	820519		288	1.56	87	5.00E-03	288	3.03E-06	288	3	1.55	87	1.00E-02	288	4.85E-06	22.05	6.68E-05	9.90E-05	3	
LS6b(162)		838445	820538		268	1.56	87	5.00E-03	268	3.77E-06	268	3	1.55	87	1.00E-02	268	6.03E-06	21.67	8.17E-05	1.17E-04	3	
LS6b(163)		838431	820552		258	1.56	87	5.00E-03	258	4.20E-06	258	3	1.55	87	1.00E-02	258	6.71E-06	21.48	9.01E-05	1.27E-04	3	
LS6b(164)		838367	820549		288	1.56	87	5.00E-03	288	3.03E-06	288	3	1.55	87	1.00E-02	288	4.85E-06	22.05	6.68E-05	9.91E-05	3	
LS6b(165)		838351	820543		301	1.56	87	5.00E-03	301	2.65E-06	301	3	1.55	87	1.00E-02	301	4.24E-06	22.27	5.91E-05	8.94E-05	3	
LS6b(166)		838335	820546		308	1.56	87	5.00E-03	308	2.49E-06	308	3	1.55	87	1.00E-02	308	3.98E-06	22.38	5.57E-05	8.50E-05	3	
LS6b(167)		838319	820546		318	1.56	87	5.00E-03	318	2.25E-06	318	3	1.55	87	1.00E-02	318	3.60E-06	22.54	5.08E-05	7.86E-05	3	
LS6b(168)		838304	820542		330	1.56	87	5.00E-03	330	2.02E-06	330	3	1.55	87	1.00E-02	330	3.23E-06	22.71	4.58E-05	7.20E-05	3	
LS6b(169)		838294	820533		343	1.56	87	5.00E-03	343	1.79E-06	343	3	1.55	87	1.00E-02	343	2.86E-06	22.90	4.10E-05	6.55E-05	3	
LS6b(170)		838280	820528		356	1.56	88	5.00E-03	356	1.61E-06	356	3	1.55	87	1.00E-02	356	2.57E-06	23.06	3.70E-05	6.01E-05	2	
LS6b(171)		838264	820525		368	1.56	88	5.00E-03	368	1.45E-06	368	3	1.55	87	1.00E-02	368	2.32E-06	23.21	3.36E-05	5.53E-05	2	
LS6b(172)		838353	820559		287	1.56	87	5.00E-03	287	3.06E-06	287	3	1.55	87	1.00E-02	287	4.90E-06	22.03	6.75E-05	9.99E-05	3	
LS6b(173)		838334	820567		292	1.56	87	5.00E-03	292	2.90E-06	292	3	1.55	87	1.00E-02	292	4.65E-06	22.12	6.42E-05	9.59E-05	3	
LS6b(174)		838318	820563		305	1.56	87	5.00E-03	305	2.56E-06	305	3	1.55	87	1.00E-02	305	4.09E-06	22.33	5.71E-05	8.69E-05	3	
LS6b(175)		838305	820559		317	1.56	87	5.00E-03	317	2.28E-06	317	3	1.55	87	1.00E-02	317	3.65E-06	22.52	5.13E-05	7.94E-05	3	
LS6b(176)		838290	820558		327	1.56	87	5.00E-03	327	2.07E-06	327	3	1.55	87	1.00E-02	327	3.31E-06	22.67	4.70E-05	7.36E-05	3	
LS6b(177)		838282	820546		341	1.56	87	5.00E-03	341	1.82E-06	341	3	1.55	87	1.00E-02	341	2.92E-06	22.87	4.17E-05	6.65E-05	3	
LS6b(178)		838269	820543		352	1.56	88	5.00E-03	352	1.66E-06	352	3	1.55	87	1.00E-02	352	2.65E-06	23.01	3.81E-05	6.16E-05	2	

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eye $= E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_v = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$					
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree												
LS6b(179)		838255	820541		364		1.56	88	5.00E-03	364	1.50E-06	364	3	1.55	87	1.00E-02	364	2.40E-06	23.16	3.48E-05	5.69E-05	2					
LS6b(180)		838257	820557		351		1.56	88	5.00E-03	351	1.68E-06	351	3	1.55	87	1.00E-02	351	2.69E-06	22.99	3.86E-05	6.23E-05	2					
LS6b(181)		838276	820563		333		1.56	87	5.00E-03	333	1.95E-06	333	3	1.55	87	1.00E-02	333	3.12E-06	22.76	4.44E-05	7.02E-05	3					
LS6b(182)		838296	820576		310		1.56	87	5.00E-03	310	2.43E-06	310	3	1.55	87	1.00E-02	310	3.88E-06	22.41	5.44E-05	8.34E-05	3					
LS6b(183)		838315	820583		292		1.56	87	5.00E-03	292	2.90E-06	292	3	1.55	87	1.00E-02	292	4.64E-06	22.12	6.42E-05	9.58E-05	3					
LS6b(184)		838331	820582		282		1.56	87	5.00E-03	282	3.23E-06	282	3	1.55	87	1.00E-02	282	5.16E-06	21.94	7.08E-05	1.04E-04	3					
LS6b(185)		838343	820577		278		1.56	87	5.00E-03	278	3.36E-06	278	3	1.55	87	1.00E-02	278	5.38E-06	21.87	7.35E-05	1.07E-04	3					
LS6b(186)		838339	820602		262		1.56	87	5.00E-03	262	4.03E-06	262	3	1.55	87	1.00E-02	262	6.45E-06	21.55	8.69E-05	1.23E-04	3					
LS6b(187)		838323	820599		274		1.56	87	5.00E-03	274	3.50E-06	274	3	1.55	87	1.00E-02	274	5.60E-06	21.80	7.63E-05	1.11E-04	3					
LS6b(188)		838308	820597		286		1.56	87	5.00E-03	286	3.08E-06	286	3	1.55	87	1.00E-02	286	4.93E-06	22.02	6.78E-05	1.00E-04	3					
LS6b(189)		838291	820602		296		1.56	87	5.00E-03	296	2.80E-06	296	3	1.55	87	1.00E-02	296	4.48E-06	22.18	6.21E-05	9.32E-05	3					
LS6b(190)		838281	820581		316		1.56	87	5.00E-03	317	2.28E-06	316	3	1.55	87	1.00E-02	317	3.65E-06	22.52	5.14E-05	7.94E-05	3					
LS6b(191)		838263	820571		337		1.56	87	5.00E-03	337	1.89E-06	337	3	1.55	87	1.00E-02	337	3.02E-06	22.82	4.30E-05	6.83E-05	3					
LS6b(192)		838268	820590		321		1.56	87	5.00E-03	321	2.19E-06	321	3	1.55	87	1.00E-02	321	3.50E-06	22.58	4.94E-05	7.68E-05	3					
LS6b(193)		838274	820609		304		1.56	87	5.00E-03	304	2.58E-06	304	3	1.55	87	1.00E-02	304	4.13E-06	22.32	5.76E-05	8.75E-05	3					
LS6b(194)		838256	820600		324		1.56	87	5.00E-03	324	2.13E-06	324	3	1.55	87	1.00E-02	324	3.41E-06	22.63	4.82E-05	7.52E-05	3					
LS6b(195)		838251	820582		339		1.56	87	5.00E-03	339	1.85E-06	339	3	1.55	87	1.00E-02	339	2.96E-06	22.84	4.23E-05	6.74E-05	3					
LS6b(196)		838243	820565		356		1.56	88	5.00E-03	356	1.61E-06	356	3	1.55	87	1.00E-02	356	2.57E-06	23.06	3.71E-05	6.01E-05	2					
LS6b(197)		838235	820576		356		1.56	88	5.00E-03	356	1.61E-06	356	3	1.55	87	1.00E-02	356	2.57E-06	23.06	3.70E-05	6.01E-05	2					
LS6b(198)		838240	820592		341		1.56	87	5.00E-03	341	1.82E-06	341	3	1.55	87	1.00E-02	341	2.91E-06	22.87	4.16E-05	6.63E-05	3					
LS6b(199)		838244	820611		327		1.56	87	5.00E-03	327	2.07E-06	327	3	1.55	87	1.00E-02	327	3.32E-06	22.67	4.70E-05	7.36E-05	3					
									sum	2.37E-04										sum	3.79E-04						
Light Sources drawing are referred to Page 4 in Appendix 11G																											
LS6d		Light Sources Type		SFC09		Approximate reflectance factor for Concrete ground										0.4											
LS6d (1)		838510	820534		263		1.56	87	5.00E-03	263	5.48E-05	263	4	1.54	86	1.00E-02	263	8.77E-05	19.93	1.09E-03	1.32E-03	3					
LS6d (2)		838429	820709		121		1.55	87	5.00E-03	122	4.16E-04	121	4	1.51	84	1.00E-02	122	8.85E-04	16.76	6.97E-03	5.97E-03	3					
LS6d (3)		838514	820520		277		1.56	87	5.00E-03	277	3.50E-05	277	4	1.54	86	1.00E-02	277	7.46E-05	21.85	7.65E-04	1.11E-03	3					
LS6d (4)		838436	820690		132		1.55	87	5.00E-03	132	3.27E-04	132	4	1.51	85	1.00E-02	132	6.98E-04	17.31	5.67E-03	5.18E-03	3					
LS6d (5)		838493	820530		268		1.56	87	5.00E-03	268	3.88E-05	268	4	1.54	86	1.00E-02	268	8.28E-05	21.67	8.41E-04	1.21E-03	3					
LS6d (6)		838493	820530		268		1.56	87	5.00E-03	268	3.88E-05	268	4	1.54	86	1.00E-02	268	8.28E-05	21.67	8.41E-04	1.21E-03	3					
LS6d (7)		838493	820530		268		1.56	87	5.00E-03	268	3.88E-05	268	4	1.54	86	1.00E-02	268	8.28E-05	21.67	8.41E-04	1.21E-03	3					
LS6d (8)		838493	820530		268		1.56	87	5.00E-03	268	3.88E-05	268	4	1.54	86	1.00E-02	268	8.28E-05	21.67	8.41E-04	1.21E-03	3					
LS6d (9)		838497	820515		282		1.56	87	5.00E-03	282	3.32E-05	282	4	1.54	86	1.00E-02	282	7.09E-05	21.94	7.29E-04	1.07E-03	3					
LS6d (10)		838493	820515		282		1.56	87	5.00E-03	282	3.32E-05	282	4	1.54	86	1.00E-02	282	7.09E-05	21.94	7.29E-04	1.07E-03	3					
LS6d (11)		838497	820515		282		1.56	87	5.00E-03	282	3.32E-05	282	4	1.54	86	1.00E-02	282	7.09E-05	21.94	7.29E-04	1.07E-03	3					
LS6d (12)		838497	820515		282		1.56	87	5.00E-03	282	3.32E-05	282	4	1.54	86	1.00E-02	282	7.09E-05	21.94	7.29E-04	1.07E-03	3					
LS6d (13)		838476	820526		274		1.56	87	5.00E-03	274	3.63E-05	274	4	1.54	86	1.00E-02	274	7.74E-05	21.79	7.91E-04	1.15E-03	3					
LS6d (14)		838476	820526		274		1.56	87	5.00E-03	274	3.63E-05	274	4	1.54	86	1.00E-02	274	7.74E-05	21.79	7.91E-04	1.15E-03	3					
LS6d (15)		838480	820511		288		1.56	87	5.00E-03	288	3.13E-05	288	4	1.54	86	1.00E-02	288	6.67E-05	22.05	6.89E-04	1.02E-03	3					
LS6d (16)		838480	820511		288		1.56	87	5.00E-03	288	3.13E-05	288	4	1.54	86	1.00E-02	288	6.67E-05	22.05	6.89E-04	1.02E-03	3					
									sum	1.26E-03										sum	2.65E-03						
										1.61E-03											3.21E-03						
Light source LS7: Road Lighting																											

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries $\Phi = \arctan(d/2h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (f \times f \times \beta \times I \times \cos\Phi) / d^2$	tan Φ	Eye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_{vl} = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2h	Φ Degree							
LS7(1)	17672.605	838525	820610	6	187	15	1.49	83	0.00E+00	188	0.00E+00	187	15	1.49	83	1.00E+00	188	4.00E-02	8.67	0.00E+00	0.00E+00	7
LS7(2)	10551.9244	838163	820463		483		1.54	86	0.00E+00	484	0.00E+00	483		1.54	86	1.00E+00	484	1.40E-03	15.15	0.00E+00	0.00E+00	4
sum 0.00E+00 Light source LS8: Ancillary Building sum 4.14E-02																						
L05R	400000	838082	820761	50	433	29	1.50	84	0.00E+00	434	0.00E+00	433	29	1.50	84	1.00E+00	434	1.42E-01	9.79	0.00E+00	0.00E+00	6
L13R	500000	837884	820306	50	798	29	1.53	86	0.00E+00	799	0.00E+00	370	29	1.49	84	1.00E+00	371	2.84E-01	14.02	0.00E+00	0.00E+00	4
sum 0.00E+00 Total sum 1.30E-03 sum 1.42E-01 sum 1.22E+00 5.76E-01 1.14E-01																						

Ehav	Lvl	$L_{ve} = 0.035p E_{hav} / \pi$	Glare rating = $27 + 24 \log_{10} (L_{vl})$
1.22E+00	1.14E-01	0.0109	47

Glare impact calculation to Light Sensitivity Receiver L06T

Future Road D2

Sensitivity Receiver L06T Coordinate		
X (m)	Y (m)	Z (mPD)
838804	820736	7

The inverse square law and cosine law can be used to calculate illuminance at a point from intensity data.

horizontal illuminance (lx) $E_h = (r \times f \times \beta \times I \times \cos\theta) / d^2$

where I is intensity of lighting source (cd),

β is beam factor (proportion of lamp lumens contained within the beam)

d is the distance from the light source to sensitive receiver (m),

θ is the angle of incidence of the intensity of a light source,

f is maintenance factor= 0.7

r is Approximate reflectance for concrete ground= 0.4

for wall surface= 0.8

for grass= 0.2

Direct Light										Reflected light										Illuminance at the observer's eye in a plane perpendicular to the line of sight caused by the lighting installation E eye							
Light source LS1: Main Stadium																											
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1a	Light Sources Type	SFC02	Approximate reflectance factor for concrete ground																	0.4					
Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (f \times \beta \times I \times \cos\theta) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times f \times \beta \times I \times \cos\theta) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_{vl} = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$					
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree												
LS1a (10)	6890	838379	820483	18	495	11.5	1.55	87	No direct light	0.00E+00	495	16.5	1.50	84	1.00E-02	495	5.23E-06	17.18	0.00E+00	0.00E+00	3						
LS1a (11)		838394	820482		483	1.55	87	483			483		1.50	84	1.00E-02	483	5.64E-06	17.01	0.00E+00	0.00E+00	3						
LS1a (12)		838408	820479		472	1.55	87	472			472		1.50	84	1.00E-02	472	6.03E-06	16.86	0.00E+00	0.00E+00	3						
LS1a (13)		838422	820474		463	1.55	87	464			464		1.50	84	1.00E-02	464	6.37E-06	16.73	0.00E+00	0.00E+00	3						
LS1a (14)		838435	820466		457	1.55	87	457			457		1.50	84	1.00E-02	458	6.63E-06	16.63	0.00E+00	0.00E+00	3						
LS1a (15)		838446	820457		454	1.55	87	454			454		1.50	84	1.00E-02	454	6.79E-06	16.58	0.00E+00	0.00E+00	3						
LS1a (16)		838457	820446		452	1.55	87	453			453		1.50	84	1.00E-02	453	6.85E-06	16.56	0.00E+00	0.00E+00	3						
LS1a (17)		838466	820434		453	1.55	87	453			453		1.50	84	1.00E-02	453	6.82E-06	16.57	0.00E+00	0.00E+00	3						
LS1a (18)		838474	820422		456	1.55	87	456			456		1.50	84	1.00E-02	456	6.70E-06	16.61	0.00E+00	0.00E+00	3						
LS1a (19)		838481	820408		461	1.55	87	461			461		1.50	84	1.00E-02	461	6.49E-06	16.68	0.00E+00	0.00E+00	3						
LS1a (20)		838485	820394		468	1.55	87	468			468		1.50	84	1.00E-02	469	6.17E-06	16.80	0.00E+00	0.00E+00	3						
LS1a (21)		838486	820378		478	1.55	87	479			478		1.50	84	1.00E-02	479	5.79E-06	16.95	0.00E+00	0.00E+00	3						
LS1a (22)		838486	820363		490	1.55	87	490			490		1.50	84	1.00E-02	490	5.40E-06	17.11	0.00E+00	0.00E+00	3						
LS1a (23)		838486	820348		502	1.55	87	502			502		1.51	84	1.00E-02	502	5.03E-06	17.27	0.00E+00	0.00E+00	3						
LS1a (24)		838486	820333		513	1.55	87	513			513		1.51	84	1.00E-02	513	4.70E-06	17.43	0.00E+00	0.00E+00	3						
LS1a (25)		838485	820318		526	1.55	87	526			526		1.51	84	1.00E-02	526	4.37E-06	17.59	0.00E+00	0.00E+00	3						
LS1a (26)		838481	820303		540	1.55	87	540			540		1.51	85	1.00E-02	540	4.03E-06	17.77	0.00E+00	0.00E+00	3						
LS1a (27)		838475	820290		554	1.55	87	555			554		1.51	85	1.00E-02	555	3.73E-06	17.95	0.00E+00	0.00E+00	3						
LS1a (28)		838467	820276		570	1.55	87	570			570		1.51	85	1.00E-02	570	3.43E-06	18.13	0.00E+00	0.00E+00	3						
LS1a (29)		838458	820264		585	1.55	87	585			585		1.51	85	1.00E-02	585	3.17E-06	18.31	0.00E+00	0.00E+00	3						
LS1a (30)		838448	820253		600	1.55	87	600			600		1.52	85	1.00E-02	600	2.94E-06	18.47	0.00E+00	0.00E+00	3						
LS1a (31)		838436	820244		614	1.55	87	614			614		1.52	85	1.00E-02	614	2.74E-06	18.63	0.00E+00	0.00E+00	3						
sum											0.00E+00		sum										1.15E-04				
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1b	Light Sources Type		SFC10	Approximate reflectance factor for wall surface																	0.8				

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (r \times \beta \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/2/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times \beta \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_{vl} = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$						
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree													
LS1b (10)	272000	838379	820483	40	495	33.5	1.50	84	No direct light	496	No direct light	498	33.5	1.44	80	1.00E-02	499	8.15E-04	9.72	0.00E+00	0.00E+00	6						
LS1b (11)		838394	820482		483		1.50	84		484		486		1.43	80	1.00E-02	487	8.78E-04	9.56	0.00E+00	0.00E+00	6						
LS1b (12)		838408	820479		472		1.50	84		473		475		1.43	80	1.00E-02	476	9.37E-04	9.42	0.00E+00	0.00E+00	6						
LS1b (13)		838422	820474		463		1.50	84		465		466		1.43	80	1.00E-02	468	9.91E-04	9.30	0.00E+00	0.00E+00	6						
LS1b (14)		838435	820466		457		1.50	84		459		460		1.43	80	1.00E-02	462	1.03E-03	9.22	0.00E+00	0.00E+00	6						
LS1b (15)		838446	820457		454		1.50	84		455		457		1.43	80	1.00E-02	458	1.05E-03	9.17	0.00E+00	0.00E+00	6						
LS1b (16)		838457	820446		452		1.50	84		454		455		1.42	80	1.00E-02	457	1.06E-03	9.15	0.00E+00	0.00E+00	6						
LS1b (17)		838466	820434		453		1.50	84		454		456		1.42	80	1.00E-02	457	1.06E-03	9.16	0.00E+00	0.00E+00	6						
LS1b (18)		838474	820422		456		1.50	84		457		459		1.43	80	1.00E-02	460	1.04E-03	9.20	0.00E+00	0.00E+00	6						
LS1b (19)		838481	820408		461		1.50	84		462		464		1.43	80	1.00E-02	465	1.01E-03	9.27	0.00E+00	0.00E+00	6						
LS1b (20)		838485	820394		468		1.50	84		470		471		1.43	80	1.00E-02	473	9.60E-04	9.37	0.00E+00	0.00E+00	6						
LS1b (21)		838486	820378		478		1.50	84		480		481		1.43	80	1.00E-02	483	9.02E-04	9.51	0.00E+00	0.00E+00	6						
LS1b (22)		838486	820363		490		1.50	84		491		493		1.44	80	1.00E-02	494	8.41E-04	9.66	0.00E+00	0.00E+00	6						
LS1b (23)		838486	820348		502		1.50	84		503		505		1.44	80	1.00E-02	506	7.84E-04	9.81	0.00E+00	0.00E+00	6						
LS1b (24)		838486	820333		513		1.51	84		514		516		1.44	81	1.00E-02	517	7.33E-04	9.96	0.00E+00	0.00E+00	6						
LS1b (25)		838485	820318		526		1.51	84		527		529		1.44	81	1.00E-02	530	6.82E-04	10.12	0.00E+00	0.00E+00	6						
LS1b (26)		838481	820303		540		1.51	84		541		543		1.45	81	1.00E-02	544	6.31E-04	10.29	0.00E+00	0.00E+00	6						
LS1b (27)		838475	820290		554		1.51	85		555		557		1.45	81	1.00E-02	558	5.83E-04	10.47	0.00E+00	0.00E+00	5						
LS1b (28)		838467	820276		570		1.51	85		571		573		1.45	81	1.00E-02	574	5.38E-04	10.65	0.00E+00	0.00E+00	5						
LS1b (29)		838310	820455		569		1.51	85		570		572		1.45	81	1.00E-02	573	5.41E-04	10.63	0.00E+00	0.00E+00	5						
LS1b (30)		838322	820465		554		1.51	85		555		557		1.45	81	1.00E-02	558	5.85E-04	10.46	0.00E+00	0.00E+00	5						
LS1b (31)		838335	820472		538		1.51	84		539		541		1.45	81	1.00E-02	542	6.36E-04	10.27	0.00E+00	0.00E+00	6						
sum										0.00E+00		sum										1.83E-02						
Light Sources drawing are referred to Page 4 in Appendix 11G		LS1c	Light Sources Type		LED																							
LS1c (1)		756000	838470		820427		17.5	455		11		1.55		87	5.00E-03	455	4.40E-04	455	11	1.52	85	1.00E-02	456	1.76E-03	16.91	7.44E-03	6.50E-03	3
sum										4.40E-04		sum										1.76E-03						
sum										4.40E-04		sum										2.02E-02						
Light Source LS2: Public Sports Ground																												
Light Sources drawing are referred to Page 4 in Appendix 11G		LS2b	Light Sources Type		SFC6		Approximate reflectance factor for grass																	0.2				
sum										0.00E+00		sum										0.00E+00						
Light Source LS3: Indoor Sports Centre																												
Light Sources drawing are referred to Page 4 in Appendix 11G		LS3d	Light Sources Type		SFC07&8	Approximate reflectance factor for runway																0.4						
LS3d(1)	2252000	838307	820838	68	507	62	1.45	81	5.00E-03	511	3.63E-03	507	62	1.33	74	1.00E-02	511	5.75E-03	6.38	2.32E-02	2.92E-03	9						
LS3d(2)	2252000	838321	820825	68	492	62	1.45	81	5.00E-03	495	3.99E-03	492	62	1.32	74	1.00E-02	496	6.31E-03	6.22	2.48E-02	2.97E-03	9						
LS3d(3)	2252000	838328	820805	68	481	62	1.44	81	5.00E-03	485	4.25E-03	481	62	1.32	73	1.00E-02	485	6.72E-03	6.12	2.60E-02	3.02E-03	9						
LS3d(4)	2252000	838336	820785	68	471	62	1.44	81	5.00E-03	475	4.51E-03	471	62	1.31	73	1.00E-02	476	7.12E-03	6.02	2.72E-02	3.05E-03	9						
LS3d(5)	2252000	838343	820766	68	462	62	1.44	80	5.00E-03	466	4.78E-03	462	62	1.31	73	1.00E-02	466	7.54E-03	5.93	2.83E-02	3.09E-03	10						
LS3d(6)	2252000	838351	820746	68	454	62	1.44	80	5.00E-03	458	5.05E-03	454	62	1.30	73	1.00E-02	458	7.96E-03	5.84	2.95E-02	3.12E-03	10						
LS3d(7)	2252000	838358	820726	68	447	62	1.43	80	5.00E-03	451	5.28E-03	447	62	1.30	72	1.00E-02	451	8.32E-03	5.77	3.05E-02	3.15E-03	10						
LS3d(8)	2252000	838365	820706	68	440	62	1.43	80	5.00E-03	445	5.51E-03	440	62	1.30	72	1.00E-02	445	8.67E-03	5.70	3.14E-02	3.17E-03	10						
LS3d(9)	2252000	838372	820690	68	435	62	1.43	80	5.00E-03	439	5.71E-03	435	62	1.29	72	1.00E-02	440	8.98E-03	5.65	3.22E-02	3.20E-03	10						
LS3d(10)	2252000	838373	820683	68	434	62	1.43	80	5.00E-03	438	5.75E-03	434	62	1.29	72	1.00E-02	439	9.04E-03	5.63	3.24E-02	3.20E-03	10						
LS3d(11)	2252000	838375	820674	68	434	62	1.43	80	5.00E-03	438	5.75E-03	434	62	1.29	72	1.00E-02	438	9.05E-03	5.63	3.24E-02	3.20E-03	10						
LS3d(12)	2252000	838374	820666	68	436	62	1.43	80	5.00E-03	440	5.68E-03	436	62	1.29	72	1.00E-02	440	8.94E-03	5.65	3.21E-02	3.19E-03	10						
LS3d(13)	2252000	838373	820657	68	439	62	1.43	80	5.00E-03	443	5.57E-03	439	62	1.29	72	1.00E-02	443	8.76E-03	5.68	3.17E-02	3.18E-03	10						

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h) - 2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (I \times \beta \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/2/h) - 2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (I \times \beta \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_{vl} = \sum (E_e / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\Theta = 90 - \Phi$												
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree																			
LS3d(14)	2252000	838370	820649	68	443	62	1.43	80	5.00E-03	448	5.40E-03	443	62	1.30	72	1.00E-02	448	8.51E-03	5.73	3.10E-02	3.16E-03	10												
LS3d(15)	2252000	838365	820641	68	449	62	1.43	80	5.00E-03	453	5.20E-03	449	62	1.30	72	1.00E-02	454	8.19E-03	5.79	3.01E-02	3.14E-03	10												
LS3d(16)	2252000	838360	820635	68	456	62	1.44	80	5.00E-03	460	4.97E-03	456	62	1.30	73	1.00E-02	460	7.84E-03	5.86	2.92E-02	3.11E-03	10												
LS3d(17)	2252000	838353	820629	68	464	62	1.44	80	5.00E-03	468	4.73E-03	464	62	1.31	73	1.00E-02	468	7.46E-03	5.94	2.81E-02	3.08E-03	10												
LS3d(18)	2252000	838345	820625	68	472	62	1.44	81	0.00E+00	476	0.00E+00	472	62	1.31	73	1.00E-02	476	7.09E-03	6.03	0.00E+00	0.00E+00	9												
LS3d(19)	2252000	838337	820622	68	481	62	1.44	81	0.00E+00	484	0.00E+00	481	62	1.32	73	1.00E-02	485	6.74E-03	6.11	0.00E+00	0.00E+00	9												
LS3d(20)	2252000	838328	820620	68	490	62	1.45	81	0.00E+00	494	0.00E+00	490	62	1.32	74	1.00E-02	494	6.38E-03	6.20	0.00E+00	0.00E+00	9												
LS3d(21)	2252000	838320	820620	68	498	62	1.45	81	0.00E+00	502	0.00E+00	498	62	1.33	74	1.00E-02	502	6.06E-03	6.29	0.00E+00	0.00E+00	9												
LS3d(22)	2252000	838311	820620	68	507	62	1.45	81	0.00E+00	511	0.00E+00	507	62	1.33	74	1.00E-02	511	5.77E-03	6.37	0.00E+00	0.00E+00	9												
LS3d(23)	2252000	838302	820622	68	515	62	1.45	81	0.00E+00	519	0.00E+00	515	62	1.33	74	1.00E-02	519	5.51E-03	6.45	0.00E+00	0.00E+00	9												
LS3d(24)	2252000	838294	820624	68	523	62	1.45	81	0.00E+00	526	0.00E+00	523	62	1.34	75	1.00E-02	526	5.27E-03	6.53	0.00E+00	0.00E+00	9												
LS3d(25)	2252000	838286	820627	68	530	62	1.46	81	0.00E+00	534	0.00E+00	530	62	1.34	75	1.00E-02	534	5.07E-03	6.60	0.00E+00	0.00E+00	9												
LS3d(26)	2252000	838278	820632	68	537	62	1.46	81	5.00E-03	540	3.08E-03	537	62	1.34	75	1.00E-02	540	4.89E-03	6.66	2.05E-02	2.81E-03	9												
LS3d(27)	2252000	838268	820630	68	546	62	1.46	82	5.00E-03	550	2.92E-03	546	62	1.35	75	1.00E-02	550	4.64E-03	6.75	1.97E-02	2.78E-03	8												
LS3d(28)	2252000	838259	820639	68	554	62	1.46	82	5.00E-03	558	2.80E-03	554	62	1.35	75	1.00E-02	558	4.45E-03	6.83	1.91E-02	2.75E-03	8												
LS3d(29)	2252000	838242	820659	68	567	62	1.46	82	5.00E-03	570	2.61E-03	567	62	1.35	76	1.00E-02	570	4.16E-03	6.95	1.81E-02	2.71E-03	8												
LS3d(30)	2252000	838230	820682	68	577	62	1.46	82	5.00E-03	580	2.48E-03	577	62	1.36	76	1.00E-02	580	3.95E-03	7.04	1.75E-02	2.67E-03	8												
LS3d(31)	2252000	838221	820706	68	584	62	1.47	82	5.00E-03	588	2.39E-03	584	62	1.36	76	1.00E-02	588	3.81E-03	7.11	1.70E-02	2.65E-03	8												
LS3d(32)	2252000	838216	820731	68	588	62	1.47	82	5.00E-03	591	2.35E-03	588	62	1.36	76	1.00E-02	591	3.74E-03	7.14	1.68E-02	2.64E-03	8												
LS3d(33)	2252000	838220	820756	68	585	62	1.47	82	5.00E-03	588	2.38E-03	585	62	1.36	76	1.00E-02	588	3.79E-03	7.11	1.69E-02	2.65E-03	8												
LS3d(34)	2252000	838227	820781	68	579	62	1.46	82	5.00E-03	582	2.46E-03	579	62	1.36	76	1.00E-02	582	3.92E-03	7.06	1.74E-02	2.67E-03	8												
LS3d(35)	2252000	838238	820803	68	570	62	1.46	82	5.00E-03	574	2.57E-03	570	62	1.36	76	1.00E-02	574	4.09E-03	6.98	1.79E-02	2.69E-03	8												
																	sum	1.12E-01			sum	2.24E-01			sum	2.24E-01								
																	sum	1.12E-01																
																	Light source LS4: Office Block																	
Light Sources drawing are referred to Page 4 in Appendix 11G																	LS4a	Light Sources Type	Approximate reflectance factor for wall surface															
																	sum	0.00E+00	2															
																	Light source LS6: Podium Deck																	
Light Sources drawing are referred to Page 4 in Appendix 11G																	LS6a	Light Sources Type	Approximate reflectance factor for Concrete ground															
LS6b(60)	6890	838551	820474	18	364	11.5	1.54	86	5.00E-03	364	5.74E-06	364	11.5	1.51	84	1.00E-02	366	7.19E-04	15.02	8.62E-05	5.94E-05	4												
LS6b(61)		838555	820458		373		1.54	86	5.00E-03	373	5.33E-06	373		5.33E-06	373	1.51	84	1.00E-02	375	6.67E-04	15.20	8.10E-05	5.71E-05	4										
LS6b(62)		838560	820441		383		1.54	86	5.00E-03	383	4.93E-06	383		4.93E-06	383	1.51	85	1.00E-02	384	6.18E-04	15.38	7.59E-05	5.48E-05	4										
LS6b(63)		838564	820425		393		1.54	86	5.00E-03	393	4.56E-06	393		4.56E-06	393	1.51	85	1.00E-02	395	5.72E-04	15.57	7.10E-05	5.25E-05	4										
LS6b(64)		838567	820387		422		1.54	86	5.00E-03	422	3.69E-06	422		3.69E-06	422	1.52	85	1.00E-02	423	4.63E-04	16.07	5.92E-05	4.67E-05	4										
LS6b(65)		838575	820375		427		1.54	86	5.00E-03	427	3.55E-06	427		3.55E-06	427	1.52	85	1.00E-02	429	4.46E-04	16.16	5.74E-05	4.57E-05	4										
LS6b(66)		838548	820382		437		1.54	86	5.00E-03	437	3.33E-06	437		3.33E-06	437	1.52	85	1.00E-02	438	4.18E-04	16.31	5.43E-05	4.41E-05	4										
LS6b(67)		838531	820377		451		1.55	87	5.00E-03	451	3.02E-06	451		3.02E-06	451	1.52	85	1.00E-02	452	3.79E-04	16.54	4.99E-05	4.17E-05	3										
LS6b(68)		838560	820372		439		1.54	86	5.00E-03	439	3.28E-06	439		3.28E-06	439	1.52	85	1.00E-02	440	4.12E-04	16.34	5.36E-05	4.37E-05	4										
LS6b(69)		838541	820367		453		1.55	87	5.00E-03	453	2.99E-06	453		2.99E-06	453	1.52	85	1.00E-02	454	3.75E-04	16.56	4.94E-05	4.14E-05	3										
LS6b(70)		838525	820365		464		1.55	87	5.00E-03	464	2.77E-06	464		2.77E-06	464	1.52	85	1.00E-02	466	3.48E-04	16.74	4.63E-05	3.96E-05	3										
LS6b(71)		838513	820358		477		1.55	87	5.00E-03	477	2.55E-06	477		2.55E-06	477	1.52	85	1.00E-02	478	3.21E-04	16.93	4.32E-05	3.78E-05	3										
LS6b(72)		838502	820344		496		1.55	87	5.00E-03	496	2.28E-06	496		2.28E-06	496	1.52	85	1.00E-02	497	2.86E-04	17.19	3.92E-05	3.53E-05	3										
LS6b(73)		838502	820361		482		1.55	87	5.00E-03	482	2.48E-06	482		2.48E-06	482	1.52	85	1.00E-02	483	3.12E-04	16.99	4.22E-05	3.72E-05	3										
LS6b(74)		838501	820376		470		1.55	87	5.00E-03	470	2.66E-06	470		2.66E-06	470	1.52	85	1.00E-02	471	3.35E-04	16.83	4.48E-05	3.88E-05	3										
LS6b(75)		838498	820393		460		1.55	87	5.00E-03	460	2.85E-06	460		2.85E-06	460	1.52	85	1.00E-02	461	3.58E-04	16.67	4.75E-05	4.03E-05	3										
LS6b(76)		838493	820410		450		1.55	87	5.00E-03	451	3.03E-06	450		3.03E-06	450	1.52	85	1.00E-02	452	3.81E-04	16.53	5.01E-05	4.18E-05	3										

Light Source ID.	Light source intensity I(cd)	Position of Light Source Coordinate			Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/h)-2$		Beam factor $\beta = 0.005$ for spill light	Distance D (m)	Horizontal plane illuminance (lux) $E_h = (r \times f \times \beta \times \cos\Phi) / d^2$	Horizontal Distance d (m)	Vertical Distance h (m)	Angle between vertical plane of observer's line of sight and the direction of the light incident from the individual luminaries from the individual luminaries $\Phi = \arctan(d/2/h)-2$		Beam factor $\beta = 0.01$ for deflection	Average Distance between GSRs and Light Source (m)	Horizontal plane illuminance (lux) $E_{hav} = (r \times f \times \beta \times \cos\Phi) / d^2$	tan Φ	Eeye = $E_h \times \tan\Phi$	Total Veiling Luminance from all luminaries $L_{vl} = \sum 10 (E_{eye} / \theta^2)$	the angle between the observer's line of sight and the direction of the light incident from the individual luminaire $\theta = 90 - \Phi$			
		X (m)	Y (m)	Z (mPD)			d/h	Φ Degree						d/2/h	Φ Degree										
LS6b(77)		838487	820426		443	1.54	87	5.00E-03	443	3.18E-06	443			1.52	85	1.00E-02	445	3.99E-04	16.42	5.22E-05	4.30E-05	3			
LS6b(78)		838478	820442		439	1.54	86	5.00E-03	439	3.27E-06	439			1.52	85	1.00E-02	440	4.11E-04	16.35	5.35E-05	4.37E-05	4			
LS6b(79)		838469	820456		437	1.54	86	5.00E-03	437	3.33E-06	437			1.52	85	1.00E-02	438	4.18E-04	16.31	5.43E-05	4.41E-05	4			
LS6b(80)		838471	820475		423	1.54	86	5.00E-03	424	3.65E-06	423			1.52	85	1.00E-02	425	4.58E-04	16.09	5.87E-05	4.64E-05	4			
LS6b(81)		838456	820472		437	1.54	86	5.00E-03	437	3.32E-06	437			1.52	85	1.00E-02	438	4.17E-04	16.31	5.42E-05	4.41E-05	4			
LS6b(82)		838448	820487		434	1.54	86	5.00E-03	434	3.38E-06	434			1.52	85	1.00E-02	436	4.25E-04	16.27	5.50E-05	4.45E-05	4			
LS6b(83)		838445	820504		427	1.54	86	5.00E-03	428	3.55E-06	427			1.52	85	1.00E-02	429	4.45E-04	16.16	5.73E-05	4.57E-05	4			
LS6b(84)		838446	820521		417	1.54	86	5.00E-03	417	3.81E-06	417			1.52	85	1.00E-02	419	4.79E-04	15.99	6.10E-05	4.76E-05	4			
LS6b(85)		838458	820538		399	1.54	86	5.00E-03	399	4.37E-06	399			1.51	85	1.00E-02	400	5.47E-04	15.67	6.84E-05	5.13E-05	4			
LS6b(86)		838480	820276		563	1.55	87	5.00E-03	563	1.55E-06	563			1.53	86	1.00E-02	564	1.95E-04	18.05	2.80E-05	2.79E-05	3			
LS6b(87)		838471	820264		577	1.55	87	5.00E-03	577	1.44E-06	577			1.53	86	1.00E-02	578	1.81E-04	18.22	2.62E-05	2.66E-05	3			
sum										9.39E-05	sum										1.18E-02				
Light Sources drawing are referred to Page 4 in Appendix 11G																									
LS6d		Light Sources Type		SFC09		Approximate reflectance factor for Lawn										0.2									
LS6d (1)		838510	820534		357	1.52	85	5.00E-03	357	1.01E-04	357	19	1.52	85	1.00E-02	357	4.03E-05	11.50	1.16E-03	4.70E-04	5				
LS6d (2)		838429	820709		376	1.52	85	5.00E-03	377	8.61E-05	376	19	1.52	85	1.00E-02	377	3.44E-05	11.87	1.02E-03	4.41E-04	5				
LS6d (3)		838514	820520		362	1.52	85	5.00E-03	363	9.64E-05	362	19	1.52	85	1.00E-02	363	3.86E-05	11.61	1.12E-03	4.61E-04	5				
LS6d (4)		838436	820690		371	1.52	85	5.00E-03	372	8.96E-05	371	19	1.52	85	1.00E-02	372	3.59E-05	11.78	1.06E-03	4.48E-04	5				
LS6d (5)		838493	820530		373	1.52	85	5.00E-03	374	8.81E-05	373	19	1.52	85	1.00E-02	374	3.53E-05	11.81	1.04E-03	4.45E-04	5				
LS6d (6)		838493	820530		373	1.52	85	5.00E-03	374	8.81E-05	373	19	1.52	85	1.00E-02	374	3.53E-05	11.81	1.04E-03	4.45E-04	5				
LS6d (7)		838493	820530		373	1.52	85	5.00E-03	374	8.81E-05	373	19	1.52	85	1.00E-02	374	3.53E-05	11.81	1.04E-03	4.45E-04	5				
LS6d (8)		838493	820530		373	1.52	85	5.00E-03	374	8.81E-05	373	19	1.52	85	1.00E-02	374	3.53E-05	11.81	1.04E-03	4.45E-04	5				
LS6d (9)		838497	820515		378	1.52	85	5.00E-03	379	8.46E-05	378	19	1.52	85	1.00E-02	379	3.38E-05	11.91	1.01E-03	4.37E-04	5				
LS6d (10)		838497	820515		378	1.52	85	5.00E-03	379	8.46E-05	378	19	1.52	85	1.00E-02	379	3.38E-05	11.91	1.01E-03	4.37E-04	5				
LS6d (11)		838497	820515		378	1.52	85	5.00E-03	379	8.46E-05	378	19	1.52	85	1.00E-02	379	3.38E-05	11.91	1.01E-03	4.37E-04	5				
LS6d (12)		838497	820515		378	1.57	88	5.00E-03	379	6.87E-06	378	19	1.52	85	1.00E-02	379	3.38E-05	25.71	1.77E-04	3.56E-04	2				
LS6d (13)		838476	820526		390	1.52	85	5.00E-03	390	7.74E-05	390	19	1.52	85	1.00E-02	390	3.10E-05	12.12	9.38E-04	4.21E-04	5				
LS6d (14)		838476	820526		390	1.52	85	5.00E-03	390	7.74E-05	390	19	1.52	85	1.00E-02	390	3.10E-05	12.12	9.38E-04	4.21E-04	5				
LS6d (15)		838480	820511		395	1.52	85	5.00E-03	395	7.46E-05	395	19	1.52	85	1.00E-02	395	2.98E-05	12.20	9.10E-04	4.15E-04	5				
LS6d (16)		838480	820511		395	1.52	85	5.00E-03	395	7.46E-05	395	19	1.52	85	1.00E-02	395	2.98E-05	12.20	9.10E-04	4.15E-04	5				
sum										1.29E-03	sum										5.47E-04				
										1.38E-03											1.23E-02				
Light source LS7: Road Lighting																									
L6T	39306.3104	838792	820717	5	23	1.5	1.50	84	0.00E+00	23	0.00E+00	23	1.5	1.50	84	1.00E+00	23	5.08E+00	9.85	0.00E+00	0.00E+00	6			
sum										0.00E+00	sum										5.08E+00				
Light source LS8: Ancillary Building																									
L05R	300000	838082	820761	50	723	43.5	1.51	85	0.00E+00	724	0.00E+00	723	44	1.51	85	1.00E+00	724	3.43E-02	10.49	0.00E+00	0.00E+00	5			
sum										0.00E+00	sum										3.43E-02				
Total sum										1.14E-01	sum										5.37E+00	7.05E-01	9.46E-02		

Ehav	Lvl	$L_{ve} = 0.035 \rho E_{hav} / \pi$	Glare rating = $27 + 24 \log_{10} (L_{vl} / L_{ve})^{0.9}$
5.37E+00	9.46E-02	0.0479	31

Appendix 11H

**Context Renderings of the Project within
the Surrounding Open Space**



1: West Elevation of Public Sports Ground



2: Indoor Sports Centre from Station Square

APPENDIX 11H: CONTEXT RENDERINGS OF THE PROJECT WITHIN THE SURROUNDING OPEN SPACE

Appendix 12A

CV of Archaeologist, Mr. Yeung Chun Tong

Yeung Chun Tong

Education : B.A. (Chinese History and Chinese Art Archaeology) 1973
University of Hong Kong
M. Phil. (History of Chinese ceramics) University of Hong Kong

Detailed Experience:

1. Professional

Sun Museum – Executive Director (May 2013 onwards) Museum Formation Stage

University Museum and Art Gallery, The University of Hong Kong (1977 – 2012)

Director of Development and Museum of Arts and Director, Museum of Fine Arts (1997 – 2012)

Curator (1994 – 1997)

Assistant Curator (1977 – 1994)

- Curated over 250 art exhibitions and edited numerous number of exhibition catalogues
- Given 120 public talks on Chinese art and culture

Asian Art Museum, San Francisco CA, U.S. A. (1997)

Hong Kong Museum of Art – Assistant Curator (1974 – 1977)

The Government of the HKSAR Executive Officer (1973)

2. Academic

Faculty of Arts, The University of Hong Kong – Honorary Associate Professor (1990 – 1999)

- Taught Chinese connoisseurship, Chinese ceramics, Chinese materials culture and museum management skills at Department of Fine Arts

School of Professional and Continuing Education (SPACE), The University of Hong Kong – Adjunct Professor

The Tokyo National Museum – Visiting Scholar (1999)

Canberra School of Art, The Australian National University – Visiting Fellow (1997)

Ying Wah College – Teacher (1973 – 1974)

3. Community Services

Current Positions

1. Leisure and Cultural Services Department – Museum Advisor
2. City University Gallery, City University of Hong Kong – Advisor
3. Hong Kong Arts Development Council – Visual Arts Advisor
4. The Ink Society – Advisor
5. Ching Chung Taoist Association of Hong Kong Ltd. – Advisor
6. The Hong Kong Art School (a division of Hong Kong Arts Centre) – External Advisor
7. Taoist Culture Research Centre, The Chinese University of Hong Kong – Committee Member
8. Chinese Temples Committee, Hong Kong and Chairman of its Working Group on Development and Culture – Member
9. Concerted Efforts Resource Centre Limited (a non-profit-making organization) – Registered Director

Past Positions

1. The Asia Society Hong Kong Centre – Gallery Advisor
2. The Hong Kong Institute of Education – Member of the Archive Committee
3. Working Group on Museums, Culture and Heritage Commission – Member
4. Museum Advisory Group, West Kowloon Cultural District - Member

Appendix 12B

**Master Plan for the Development of Kai Tak
Airport**

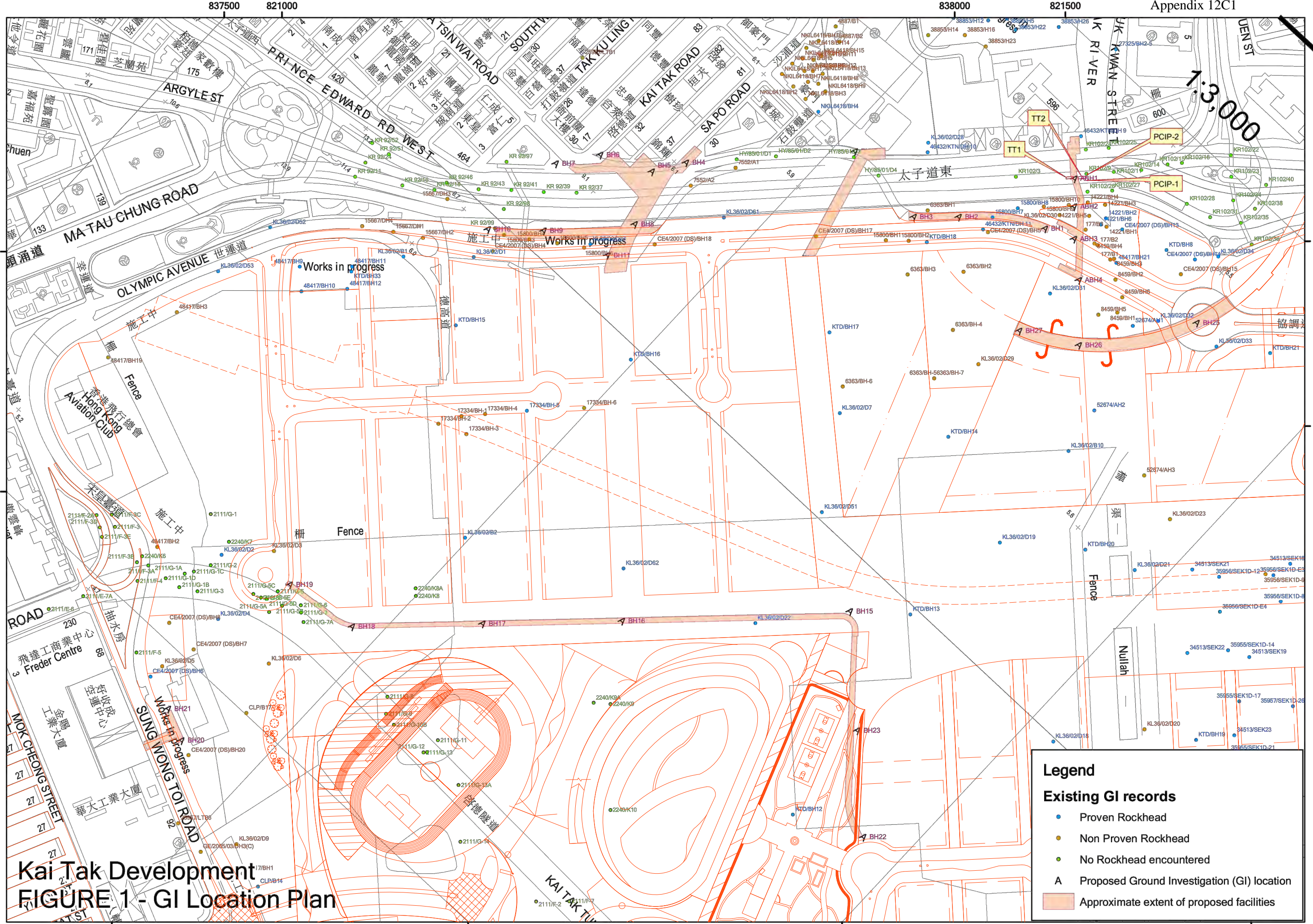


On 16 June 1954, the master plan for the development of Kai Tak Airport was approved by the government. The runway promontory covered an area of 150 acres and supported a 7 200-foot paved runway.

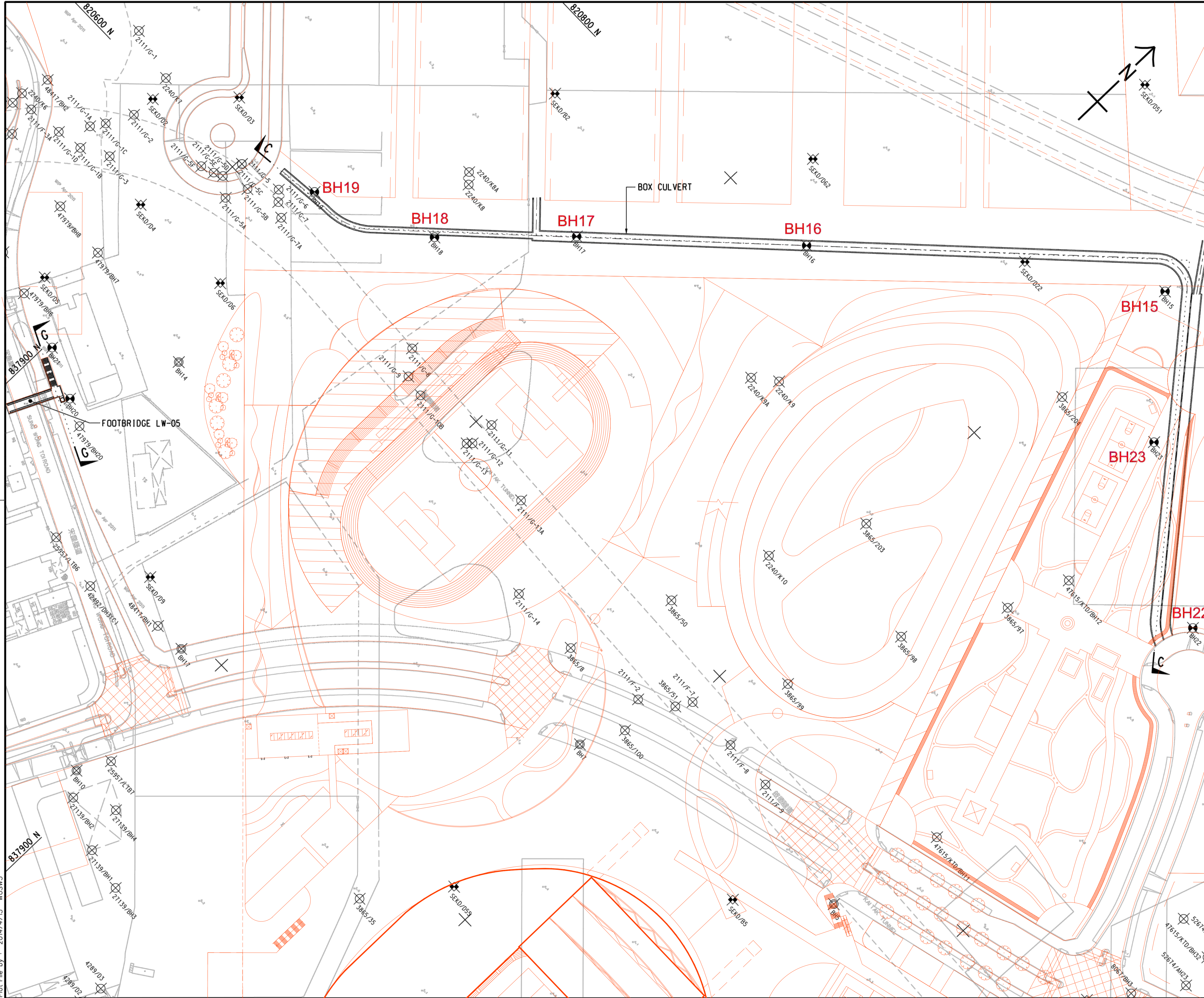
一九五四年六月十六日，政府批核了啟德機場的發展總綱計劃，跑道填海區面積達到一百五十畝，可鋪設一條長七千二百呎的跑道。

Appendix 12C

**Ground Investigation Report and Geological
Map**



Kai Tak Development
FIGURE 1 - GI Location Plan



- NOTES:**
1. FOR LEGEND REFER TO DRAWING NO. 60102100/GAR_F3/F FIGURE 3.
 2. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWING NOS. 60102100/GAR_F3/F FIGURE 11 AND FIGURE 14.

REV.	DESCRIPTION	BY	CHK	DATE

CEDD 土木工程拓展署
Civil Engineering and Development Department

KAI TAK DEVELOPMENT

KAI TAK DEVELOPMENT -
INFRASTRUCTURE AT FORMER RUNWAY AND
REMAINING AREAS OF NORTH APRON AND
IMPROVEMENT OF ADJACENT WATERWAYS -
DESIGN AND CONSTRUCTION

**GROUND INVESTIGATION
LAYOUT PLAN**

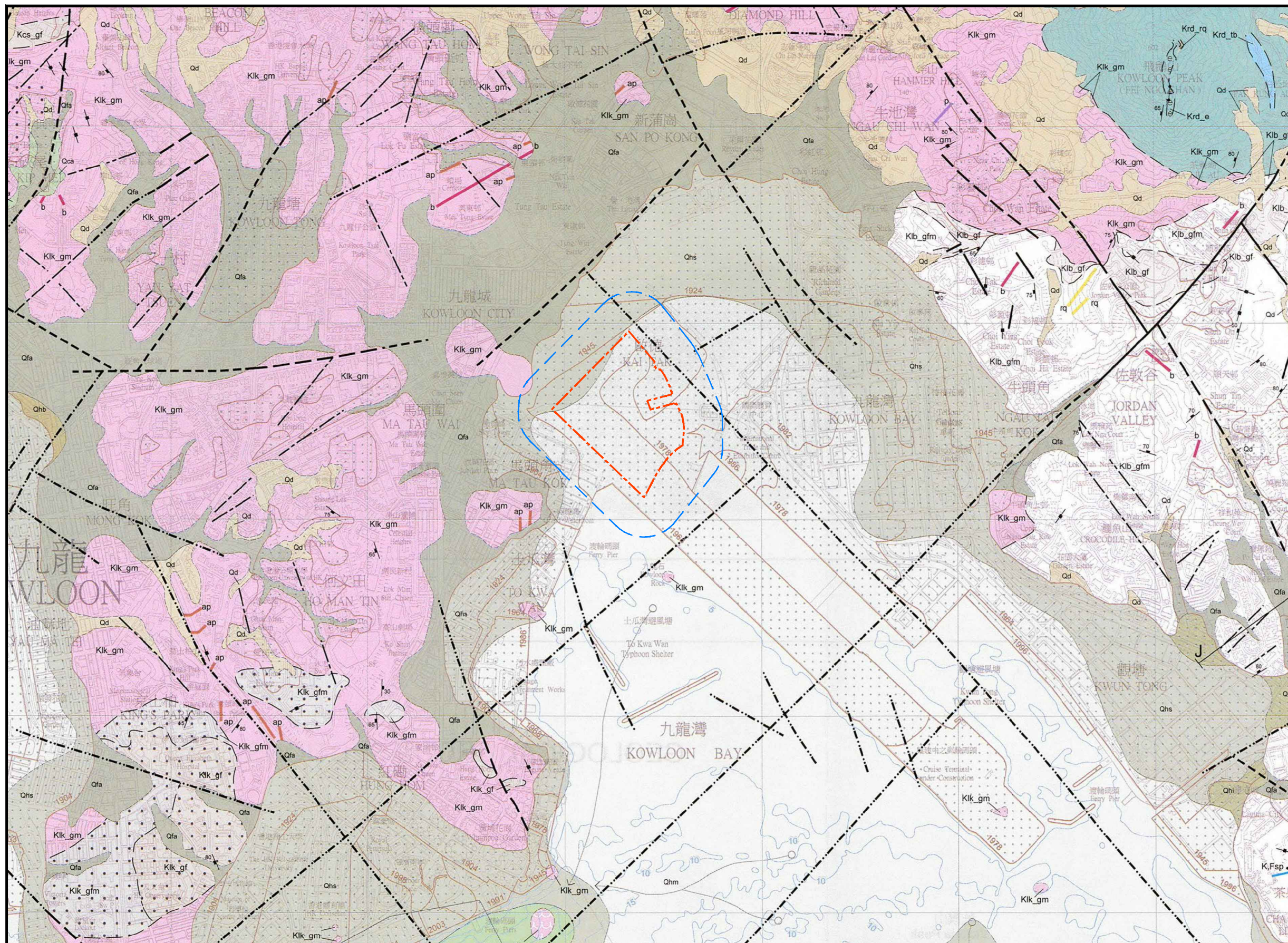
SHEET 3 OF 4

AECOM

DRGNO. 60102100/GAR_F3/F FIGURE 5
圖紙編號

DESIGNED BY 設計	CONTRACT NO. 合約編號	P.L. DIV. APPROVED 負責人
DRAWN BY 繪圖	STATUS 階段	
SCALE 比例		
DIMENSIONS ARE IN 尺寸單位		

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AGE (Millions of years)

QUATERNARY

GENETIC CLASSIFICATION OR NAMED DIVISIONS

PRINCIPAL MATERIALS

JURASSIC TO CRETACEOUS

CRETACEOUS

JURASSIC

OFFSHORE SOLID GEOLOGY

GEOLOGICAL LINES

STRUCTURAL SYMBOLS

MINERAL, FOSSIL AND MISCELLANEOUS SYMBOLS

Original geological survey by P. J. Strange (Hong Kong Geological Survey) in 1954-1955. Original offshore geology by R. Shaw (Hong Kong Geological Survey) in 1985. Updated offshore geological interpretation by D. L. K. Tang and C. W. Lee (Hong Kong Geological Survey) in 2005-2008. Updated offshore geology by R. Shaw and D. L. K. Tang (Hong Kong Geological Survey) in 2008. Base map by Survey and Mapping Office, Lands Department. Digital bathymetry supplied by Hydrographic Office, Marine Department. Published by Geotechnical Engineering Office, Civil Engineering and Development Department, Hong Kong Special Administrative Region, China. © Hong Kong Special Administrative Region Government 2012.

APPENDIX 12C2: GEOLOGICAL MAP (PART PLAN OF SHEET 11 SERIES HGM 20)

ARCHITECTURAL SERVICES DEPARTMENT

The joint venture of
CINOTECH Cinotech Consultants Ltd. and Maurice Lee & Associates Ltd.

Sub-Consultant
MVA SYSTRA GROUP

Drafting by	RW	11/15
Designed by	ML	11/15
Checked by	ML	11/15
Approved by	ML	11/15

PROJECT: CONSULTANCY SERVICES TO CARRY OUT ENVIRONMENT IMPACT ASSESSMENT AND TRAFFIC IMPACT ASSESSMENT STUDIES (THE MULTI-PURPOSE SPORTS COMPLEX AT KAI TAK AREA)

DRAWING NO: HA921/APPENDIX 12C2

REV: A

Appendix 15.1

**Key Assessment Assumptions,
Limitation of Assessment Methodologies
and Related Prior Agreement(s)**

Appendix 15.1 Key Assessment Assumptions, Limitation of Assessment Methodologies and Related Prior Agreement(s)

Assessment Methodologies	Key Assessment Assumptions	Limitations of Assessment Methodologies / Assumptions	Prior Agreements with EPD	
			EIA Study Brief Clause Reference	Relevant Document(s)
Air Quality Impact				
Construction Phase				
The air quality impact assessment (construction phase) for the Project follows Annex 4 and Annex 12 of the EIAO-TM and requirement from the EIA Study Brief (ESB-274/2014). Dust emission would be the major air quality impact and quantitative assessment has been carried out by Fugitive Dust Model (FDM).	<p>The active construction area was assumed to be 100% of the Project site for both the short term (hourly and daily) and long term (annual) assessment.</p> <p>The prediction of dust emission was based on the typical values and emission factors obtained from USEPA AP-42.</p> <p>The adopted dust suppression due to regular watering is 91.7%.</p>	<p>The dust emission of the actual site may vary from the adopted values.</p> <p>The extent of watering may vary depending on actual site conditions but constant removal efficiency is adopted during working hours.</p>	Section 3.4.3, Appendix A, and Appendix A-1	N/A
Operation Phase				
The air quality impact assessment (operation phase) for the Project follows Annex 4 and Annex 12 of the EIAO-TM and requirement from the EIA Study Brief (ESB-274/2014). The Project itself is not an air pollution source. During the operational phase, the only air emission source due to the Project is the induced traffic along the traffic routes leading to or from the future MPSC. PATH (Pollutants in the Atmosphere and their Transport over Hong Kong) model was used to predict the future background concentrations of air pollutants. Air dispersion model	<p>Pollutant concentrations predicted by PATH in year 2020 had been adopted for the background air quality for the assessment year from 2023 (the worst assessment year) to 2036 (15 years after the commencement of the Project). Since PATH does not predict FSP concentration, the background daily and annual concentrations of FSP was predicted as 75% of RSP and 71% of RSP respectively according to EPD's "Guidelines on the Estimation of PM2.5 for Air Quality Assessment in Hong Kong".</p>	<p>In consideration of air quality improvement schemes implemented by the government that would gradually take effect following year 2020, the use of 2020 PATH background in predicting pollutant concentration in years 2023 to 2036 was considered conservative.</p> <p>Based on the local and overseas operation experiences of stadia of a similar scale, it was envisaged that major events at the Main Stadium of MPSC, especially a full-house event, would not be held frequently.</p>	Section 3.4.3, Appendix A, and Appendix A-1	N/A

Assessment Methodologies	Key Assessment Assumptions	Limitations of Assessment Methodologies / Assumptions	Prior Agreements with EPD	
			EIA Study Brief Clause Reference	Relevant Document(s)
CALINE4 (California Line Source Dispersion Model Version 4) was employed to predict the concentrations of air pollutants at the identified Air Sensitivity Receivers (ASR) due to tailpipe emissions from the existing and planned open road network within the Study Area; whereas ISCST3 (Industrial Source Complex Short-Term Model) was employed to predict the concentrations due to chimney, portal, ventilation building, cruise terminal and typhoon shelter. EMFAC-HK was employed to predict the hourly emission factors for 16 vehicle classes.	60 days full events per year were considered for the assessment of annual NO ₂ . According to the Permanent International Association of Road Congress Report (PIARC, 1991), the pollutants were assumed to eject from the portal as a portal jet such that 2/3 of the total emissions was dispersed within the first 50m of the portal and the other 1/3 of the total emissions within the second 50m.	As the model constraint of CALINE4 limits the road height to 10m, roads higher than 10m were set to 10m in model. The mitigation measures (such as entry restriction of heavy vehicles during peak hours) recommended in the EIA would help reduce the vehicular emission but their benefits are not easily quantifiable for the air modelling assessment.		
Hazard to Life				
The hazard to life assessment for the Project follows Annex 4 of the EIAO-TM and requirement from the EIA Study Brief (ESB-274/2014).	The assessment for hazard to life was based on desktop review, relevant surveys and available information from public domain including the approved EIA reports.	N/A	Section 3.4.4	N/A
Noise Impact				
Construction Phase				
The noise impact assessment (construction phase) for the Project follows Annex 5 and Annex 13 of the EIAO-TM, GW-TM and requirement from the EIA Study Brief (ESB-274/2014).	The analysis of the construction noise had been based on standard acoustic principles. No direction correction is applied. The SWL of the PME are adopt from EPD and/or catalog of the PME.	SWL of the PMEs may vary from the adopted values. Worst case assumptions have been adopted.	Section 3.4.5 and Appendix C	N/A

Assessment Methodologies	Key Assessment Assumptions	Limitations of Assessment Methodologies / Assumptions	Prior Agreements with EPD	
			EIA Study Brief Clause Reference	Relevant Document(s)
	<p>The distance attenuations were calculated based on the notional source position of each construction zones.</p> <p>A positive 3dB(A) façade correction was added to the predict noise levels.</p> <p>A 5dB(A) reduction for barrier and 10dB(A) reduction for shed/enclosure/silencer were applied to the predicted noise level.</p>			
Operation Phase				
The noise impact assessment (operation phase) for the Project follows Annex 5 and Annex 13 of the EIAO-TM, and requirement from the EIA Study Brief (ESB-274/2014).	The predicted traffic flow of Year 2036 was adopted in the traffic noise assessment.	Traffic noise were predicted based on the free flow condition. Traffic congestion and hence reduced traffic speed were not taken into consideration.	Section 3.4.5 and Appendix C	N/A
	<p>The noise generated from District Cooling System was based on the values provided by Project's building services engineer.</p> <p>The distance attenuations were calculated based on the notional source position.</p>	N/A		
	The noise from the loudspeakers and spectators was modeled by ray-tracing method based on the design of the Project.	Any significant changes of the stadium's design may affect the conclusion of the assessment.		

Assessment Methodologies	Key Assessment Assumptions	Limitations of Assessment Methodologies / Assumptions	Prior Agreements with EPD	
			EIA Study Brief Clause Reference	Relevant Document(s)
	The data for the calibration of the noise model was based on measured noise level from similar activities in Hong Kong.			
Water Quality Impact				
The water quality impact assessment for the Project follows Annex 6 and Annex 14 of the EIAO-TM, and requirement from the EIA Study Brief (ESB-274/2014).	N/A	N/A	Section 3.4.6 and Appendix D1	N/A
Sewerage and Sewage Treatment Implication				
The sewerage and sewage treatment implication assessment for the Project follows Annex 14 of the EIAO-TM, and requirement from the EIA Study Brief (ESB-274/2014).	Sewage arising from the MPSC was estimated from the predicted population.	N/A	Section 3.4.7 and Appendix D2	N/A
Waste Management Implication				
The waste management implication assessment for the Project follows Annex 7 and Annex 15 of the EIAO-TM, and requirement from the EIA Study Brief (ESB-274/2014).	Waste generate in the construction phase was determined based on the design of the Project. Waste generation in the operation phase was based on the estimated population.	Any significant changes of the work activities and waste generation from the project and the waste management proposal may affect the scope and extent of the assessment.	Section 3.4.8 and Appendix E1	N/A
Land Contamination				
The land contamination assessment for the Project follows Annex 19 of the EIAO-TM, and requirement from the EIA Study Brief (ESB-274/2014).	The assessment was based on the site boundary and historical land used.	N/A	Section 3.4.9	N/A
Ecological Impact (Terrestrial)				

Assessment Methodologies	Key Assessment Assumptions	Limitations of Assessment Methodologies / Assumptions	Prior Agreements with EPD	
			EIA Study Brief Clause Reference	Relevant Document(s)
The ecological impact (terrestrial) assessment for the Project follows Annex 8 and Annex 16 of the EIAO-TM, and requirement from the EIA Study Brief (ESB-274/2014).	N/A	N/A	Section 3.4.10 and Appendix F	N/A
Landscape and Visual Impacts				
The landscape and visual impact assessment for the Project follows Annex 10 and Annex 18 of the EIAO-TM, and requirement from the EIA Study Brief (ESB-274/2014).	The assessment for glare impact assumed direct line of sight between the observers and the light source.	N/A	Section 3.4.11 and Appendix G	N/A
Cultural Heritage Impact				
The cultural heritage impact assessment for the Project follows Annex 10 and Annex 19 of the EIAO-TM, and requirement from the EIA Study Brief (ESB-274/2014).	The assessment for cultural heritage impact assessment was based on desktop review, relevant surveys and available information from public domain including the approved EIA reports.	N/A	Section 3.4.12	N/A